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Deliverable 11 – Final User Evaluation Report

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Executive Summary

This document details the results from the user evaluation activities that have taken place with the WWAAC software since the User Requirements Capture (Deliverable 2). This includes evaluation of the:

- WWAAC Simulated Web Browser;
- WWAAC Web Browser (WWB);
- WWAAC Email (WEM); and
- WWAAC Supportive Writing (WSW).

There have also been comparisons with alternative software on the market.

Users have been defined within the consortium to include end users, facilitators and experts. User evaluations have therefore sought to involve all of these groups. However, the primary target population of users is described as end users aged between 12 and 25 years (revised from the original range of 10-21 years), who use graphic symbol-based augmentative and alternative communication (AAC) systems to support their face-to-face interaction. Such individuals are likely to also use symbols in written message construction.

The methodology for the user evaluation activities can be found in Deliverable 13 – Final User Interface Report: The Evaluation Plan. The evaluation activities have been accomplished in close collaboration, in fact virtual integration, with the activities and team members of Workpackage 4, User Interface: Design and models for evaluation.

The evaluation process has consisted of 8 phases:

- Simulation Study
- Evaluation of the WWB, Alpha Version
- Evaluation of the WEM, Alpha Version
- Pilot Evaluation of the Linguistic Support Module
- Evaluation of the WWB and WEM, Beta Version
- Longitudinal Case Study of the WWB and WEM
- Longitudinal Case Study of the WWB and WEM, including the WSW
- Additional Investigations or User Consultations

Flexibility in the application of methods and tools has been essential at all stages for two key reasons. The first has been the necessity to manage the conflicting requirements of software developers for feedback on ‘unfinished’ software, versus the requirements of end users with complex needs for stable and robust software. The second has been due to the diversity and complexity of the population of users who are defined as our primary target group. These two factors have resulted in findings that are predominantly subjective, rather than the quantitative data more traditionally associated with human computer interaction studies.

The findings and resulting recommendations of each phase of the evaluation process have been fed back to the WWAAC consortium as a basis for discussion and further refinement of the WWAAC software. This iterative process has only

been possible through the close and harmonious working relationship between Workpackages 1 and 4, and the technical partners.

Users were generally very enthusiastic about the WWAAC Browser, not only about its user interface features, in particular those for switch users, but also about facilities such as highlighting and appropriate text-to-speech that is available to support reading skills. They could immediately see the benefits in terms of flexibility and customisation that the Browser could provide over and above other Web browsers. In this respect the WWAAC Browser is a significant step towards independent use of the Internet by people who use AAC. Indeed, as a direct result of evaluating the WWAAC Browser, many of the end users involved in the project were introduced to the Internet for the first time. From this experience, we can confidently conclude that a 'beginner' Internet user with complex needs will have a more positive and supportive experience of the Internet using this software than with mainstream browsers. This outcome is a significant mould-breaking achievement in its own right.

As with the WWAAC Browser the majority of users were also very positive about the WWAAC Email software. This allows people who use AAC to send and receive emails more independently, something many end users involved in the trials had not been able to do previously. Again this in itself can be regarded as a major achievement of the WWAAC project.

The evaluation of the WWAAC Supportive Writing software was less conclusive, but some positive feedback was received. A number of professionals expressed great interest in and enthusiasm for the potential of the supportive writing software to enhance the quality of written language by people who use symbols to support their communication.

Facilitators expressed the opinion that there is a genuine market for the WWAAC Browser and Email software. This is encouraging for developers in that it adds a financial incentive and an exploitation opportunity to the ethical justification for developing this specialist software. It was also very reassuring to note that during the final longitudinal evaluations, facilitators identified no major problems with this software.

Overall the WWAAC software did have a positive impact on the majority of users, and negative experiences of the software were primarily and inevitably due to technical problems. User consultations with a wider range of user groups, over and above the target users of the project, provided further endorsement of the software. The ability to personalise the WWAAC Browser and Email software, enabling configuration to suit a wide range of individual needs, and presence of additional supportive functionality such as the provision of simple summaries of content, for example, result in accessible and usable interfaces to meet complex individual needs. The evaluation process has also highlighted the importance of training and support for facilitators and end users to enable them to get the most out of this software.

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1 INTRODUCTION

The aim of Workpackage 1, User Involvement and Evaluation, is to involve users at each stage of the design and evaluation of the WWAAC software. This work has been accomplished in close collaboration, in fact virtual integration, with the activities and team members of Workpackage 4, User Interface: Design and models for evaluation. The methods and tools that underpin the results reported in this document can be found in Deliverable 13, Final User Interface Report: The Evaluation Plan.

The consortium understands the term 'user' to mean:

- **End users** of mainly symbol based Augmentative and Alternative Communication (AAC) systems, devices and other related technologies
- **Facilitators** (family members, carers, and support personnel) who provide the infrastructure and conditions that enable people who use AAC to improve their quality of life.
- **Experts** (Speech and Language Therapists, educationalists, developers and SMEs) consisting of professionals working in the field of AAC and its related technologies.

Evaluation activities have therefore sought to involve all of these sub-groups.

Whilst the consortium has a broad definition of the term 'user', the 'primary target' population of end users initially defined by the project were people between the ages of 10 and 21 years who used graphic symbol-based augmentative and alternative communication (AAC) in face-to-face interaction, and who were supported in their use of the Internet. Such individuals were also seen as likely to use symbols in written message construction. In November 2003, for largely practical reasons, a decision was taken by the evaluation team to shift the age range slightly from 10 to 21 years to 12 to 25 years. All other definitions of our primary target group remained unchanged. For a more detailed discussion of the target user population, see Section 2 of Deliverable 13.

The evaluation of prototype versions of software by people within our primary target population has been a challenging process. On the one hand, rapid prototyping and informal iterative feedback loops are required to advance the software. However, users have a pivotal role in the WWAAC project, and we have therefore sought at all stages to involve users, including those from our primary target population, in this process. In order to involve end users effectively and meaningfully, evaluators require stable, frozen software which can withstand rigorous evaluation, particularly given the complex accessing needs characteristic of many of these end users. Finding solutions to such potential pitfalls and contradictory agendas has only been possible through the close and harmonious working relationship between the evaluation and technical teams, and by the flexible application of evaluation methods and tools.

As noted above, flexibility in the application of methods and tools has been essential to meet the needs of the users involved in the project, and to maximise their participation. The population of people who use AAC is heterogeneous, even within the primary target group identified. Variation in individuals' ability to access and use technology, and variation in an individual's performance over time is great. During

the WWAAC evaluation process, emphasis was placed upon subjective assessment, as traditional quantitative performance measures in human-computer interaction were felt to be less relevant given the nature of the primary target group and the level of impairment involved. To facilitate participation in interviews by people with complex communication needs, Talking Mats (Murphy, 1998) have been utilised extensively within the evaluation process. See Deliverable 13 for a more detailed consideration of the methods and tools employed.

It is important that certain issues are considered when analysing some of the responses from end users or facilitators, particularly during the shorter pilot, alpha and beta workshops. For example, one user's attitude towards the WWB at a beta trial was very negative in the morning session. During discussions with the facilitators, it was discovered that not only was he quite tired that day, but also that he was also missing an introduction to a new communication aid by taking part in the evaluation. In the afternoon, he returned enthusiastically, having discovered that his new aid was not in fact ready, and his responses were much more positive. Points to bear in mind when considering negative feedback include:

- Negative responses may be due to technical problems (or a 'bad day') rather than software functionality.
- The user's attitude towards the system may be affected by their capabilities, prior experience and understanding of the Internet and email.
- A user who has used more advanced software functions (e.g., emailing multiple recipients) may consider the WWAAC software too basic until this added functionality is implemented.
- If a user did not like the layout of the buttons, it is possible, that with more time, a more suitable layout could have been developed using the Layout Editor (particularly true of the shorter alpha and beta evaluations).

Similarly, factors may contribute to a positive response, for example:

- If one or two people working closely with them and giving them lots of one-on-one attention.
- How well selected and compatible the pre-selected websites were with the WWB, particularly at the alpha and beta stages.
- If difficulties did arise there was somebody at hand to immediately sort out the problem and provide reassurance that is was not their fault.

The evaluators have therefore been encouraged at all stages to provide additional information or explanation if this is available, either from their own observations or from discussions with the user and/or facilitator.

The first phase of user involvement in the WWAAC project was the identification of users' requirements (Workpackage 1, Task 1.1), documented in Deliverable 2, User requirements Document. This document also contained the required methods and

tools developed in its closely related Workpackage 4. Some results from subsequent activities have been reported internally in earlier documents:

- Deliverable D7 – Workshop ISAAC 2002 including Internal Deliverable i8 – Simulator Study Report and additional evaluation activities
- Alpha Browser Evaluation Interim Report
- Alpha Email Evaluation Interim Report
- Beta Browser & Email Evaluation Interim Report

This document now reports the results of all user evaluation activities since the identification of users' requirements.

Section 2 reports the findings from the Simulator study. This included expert evaluations, preliminary end user evaluations, and two end user workshops (held at ISAAC 2002 and Communication Matters 2002) that evaluated a simulated web browser. It also involved an exploration of Widgit's Inter_Comm software with user feedback. These findings and recommendations were given to the technical partners, and formed the basis of the design of the alpha versions of the WWAAC Web Browser (WWB) and WWAAC Email software (WEM).

Section 3 reports the findings from workshops with end users in the UK, Sweden and the Netherlands that evaluated the alpha version of the WWB. These findings were regularly fed back to the technical partners, resulting in an iterative process of software development and, ultimately, in the beta version of the WWB.

Section 4 reports the findings from an internal workshop held in the UK that compared the alpha version of WEM with Widgit's Inter_Comm email software and AbleLink's Web Trek Connect email software. These findings were submitted to the technical partners to assist in the development of a beta version WEM.

Section 5 reports the findings from the Linguistic Module Pilot investigations that were conducted with two end users in Sweden, and findings from more informal investigations with two end users in the Netherlands. This process identified key areas of technical development required before longitudinal trials with the WSW could take place.

Section 6 reports the findings from the end user evaluations of the beta versions of WWB and WEM that took place in the Netherlands, Sweden, Denmark, the UK and Finland. Seventeen users evaluated the Browser software and twelve users evaluated the Email software. Again an iterative process of software development occurred with the findings being fed back to the technical partners regularly. Ultimately this resulted in versions of WWB and WEM that could be used for longer term trials.

Section 7 reports the findings from the longitudinal case studies that took place in the Netherlands, Sweden and the UK. Eleven end users evaluated the WWB, seven also evaluated the WEM, and one end user evaluated just the WEM. Results were fed back to the technical partners on a regular basis, and will inform the final version of WWB and WEM.

Section 8 reports the findings from the longitudinal case studies with end users who evaluated the WWB and the version of WEM that has the WSW integrated with it. Recommendations for improvement were fed back to the technical partners to facilitate further development of the WSW.

Section 9 reports the findings from the more informal user consultation activities that took place in the Netherlands, the UK, Sweden, Spain and Finland. Over seventy users were consulted during this process. These included professionals, people with aphasia, people with learning disabilities and elderly users. There were also some people who use AAC who were younger and older than our primary target group. Again, these recommendations were fed back to the technical partners, and will be used to inform the final version of the software.

Finally, Section 10 reflects back upon the findings of the evaluation activities and presents a summary and conclusions.

2 SIMULATOR STUDY

2.1 Introduction

This Section describes the results of evaluation activities carried out during the development phase of the simulated web browser developed by the WWAAC project. The evaluations were conducted over a period of 6 months from April 2002 and consisted of three components:

- Expert Evaluations
- Preliminary User Evaluations
- User Workshops – ISAAC 2002 Conference in Odense, Denmark & Communication Matters Conference 2002 in Lancaster, UK

The methodology for the evaluations can be found in Section 5 of Deliverable 13 – Final User Interface Report: The Evaluation Plan. However, it must be noted that a certain amount of flexibility was needed in the application of evaluation methods and techniques, and that this methodology had to be adapted to the diverse situations and characteristics of the users.

Detailed descriptions of these expert and user evaluations are given in Sections 2.2-2.5. These evaluations were also used to obtain feedback on the use of symbols to enable people using graphic symbol based augmentative and alternative communication systems to access the Internet more easily. Examples of symbol embellishment, as presented to the users, are shown in Appendix 1. They demonstrate how symbols can be used to enhance keywords, a summary page for a web site, or to embellish individual web pages themselves.

In addition, further feedback was obtained from experts and users as a result of activities at the ISAAC 2002, 10th Biennial Conference of the International Society for Augmentative and Alternative Communication, 10-15 August, 2002, Odense, Denmark.

Although this Section focuses on the evaluations of the WWAAC project's simulated web browser, a demonstration of Widgit's adapted email software, Inter_Comm VI was also provided by four users. Observations from this demonstration are described in 2.6. This will inform the development of the WWAAC project's email application.

2.2 Expert Evaluations

2.2.1 Introduction

Before testing the simulator with end users, a number of evaluations were conducted both internally within the project and with professional experts outside the project. The following represents a summary of the results from internal evaluations at Loughborough University and the ACE Centre mainly conducted during April 2002, as well as evaluations with experts from a national residential College for people with a wide range of physical disabilities in the UK.

2.2.2 Procedure

Details about the procedure used can be found in Section 5.1 of Deliverable 13. The questionnaire used with experts can be seen in Appendix 3A of Deliverable 13.

A default configuration of the browser known as “1a-topLeftX” was used during these evaluations.

2.2.3 Findings

Overall the initial impression of the value of the software was found to range from useful to very useful. It was perceived to be much better than other Web browsers designed for people with disabilities due to its flexibility. It was also noted that once switch accessibility was available, it was hard to think of any groups that the software could not potentially help. However, a reservation was expressed that it may be difficult to make many web pages accessible due to their poor design and hence this would prevent users from taking full benefit of the Internet.

Feedback was given on a number of areas, enabling recommendations to be made:

2.2.3.1 Functionality

Comments made about functionality include:

- Ensure that basic accessibility features of other browsers are also supported, e.g., the ability to switch off images/background, changing font size, etc.

Recommendation:
Ensure that basic accessibility features included in other browsers are also implemented, e.g., the ability to switch off images used in pages, the ability to switch off any background images, the ability to change font size, and the ability to change the colour of background and text.

2.2.3.2 Flexibility of using cached sites for Internet Access

Comments made about cached sites include:

- It should be possible to load and access cached web sites onto a Central Server (particularly useful for teaching purposes), in addition to being able to browse new sites.

Note: it could also be useful to be able to download favourites and cached pages onto individuals’ machines remotely.

2.2.3.3 Buttons

These need to be evaluated in more detail, but initial comments about the two design options presented included:

- HUSAT [now known as ESRI] buttons – face better perhaps for younger users
- ACE buttons – mismatch between 'speech' button and 'speak next/previous' button

Other comments made about buttons include:

- Users may wish to combine standard Internet Explorer icons with the WWAAC added functionality icons.
- The text labels are sometimes misleading
- The text labels should be consistent with Internet Explorer, e.g. use 'refresh' instead of 'update'.
- Loading - changes in the WWAAC icon are not clear. It should be much more obvious that loading is taking place.
- Switching Between Navigation and Reading - where there are on screen buttons creating 2 focal points in use (buttons and page), attention needs to be given to an easy way of switching between operating modes.
- The contrast between hover and activate is unclear.
- Experts were not keen on compound icons, e.g. 'Next' button for speech. One simple symbol is better (e.g., DynaSyms are difficult for students)
- The symbol for Link: In addition to it being conceptually confusing it is also similar to 'and' used in other symbol systems.

Note: the labels used for 'Next link' and 'Previous link' are confusing as text is missing on the default browser.

Recommendations:

A button Layout Editor is needed. It must be very simple to use, and it should be very easy to edit the icon images, the text labels and the layout independently of each other.

The feedback of browser activity must be clearer.

We need to discuss further ways of switching between operating modes of navigation and reading.

Increase contrast between hover and activate modes.

Discuss icon sets within the consortium and make recommendations for changes to existing icons in order to simplify them.

Evaluate modified icon sets with users.

Make recommendations for default configurations of icons and layouts that would be useful starting points for particular user groups. The preferred input device might be a useful category to use. Possible groups include: Single Switch Users, Two Switch users, Head Pointer Users and Joystick/mouse user.

2.2.3.4 Navigation

Whilst generally felt to be reasonable, navigation could be made simpler. One option would be to have two operating modes for the browser. The first mode would include the high level navigation buttons, i.e. use of favourites, changing settings, and moving between sites, whilst the second mode would be for use when a page was loaded and would only include within page control and navigation. This would reduce the numbers of active keys at any one time but would clearly need a mode switching control. The program DiscoverSwitch, where browsing level can be selected, should be looked at for ideas.

Users should be able to tab through each favourite and easily select them, without the need to use the control buttons to navigate through the favourites page.

Note: there is an issue of switching between browser controls and the page. We may want to be able to set the tab/return options as controlling menu buttons, or tabbing through and selecting links. Note: this second option could make it possible for a user to operate the software with two keys.

Recommendations:

Need to be discuss ways of switching between operating modes of navigation and reading. See DiscoverSwitch, which allows browsing level to be selected.

Need to be able to switch between modes using different methods, i.e. direct selection, keyboard, menu buttons.

2.2.3.5 Visual focus cues / speech cues:

Reading word by word may be tiring and / or irritating. This function seems to be more about following where you are on the page rather than providing reading support. Those developing their reading skills may be able to scan more successfully by themselves. So when in speak paragraph mode it would be useful to have a number of options available for the visual focus function:

- word by word
- line by line
- sentence by sentence
- none, i.e. continuous reading

Recommendation:

When in speak paragraph mode, allow further options for the use of the spoken frame: word by word, line by line, sentence by sentence, or continuous reading.

Other comments made about cues include:

- No speech feedback is given when the user reaches the end of a document. Also there is no feedback to say that a new page has been reached via a link.

- Cues may also be required to assist with orientation to page content. When entering a new page it may be useful to have some form of indication (a cursor of some sort perhaps) where the speech will start if activated in order to help orientate the user to the page content.

Recommendations:

Provide auditory feedback when the user reaches the end of a document.

Provide auditory feedback to say that a new page has been reached via a link.

In order to help orientate the user to the page content, indicate on a new page where the speech will start if activated.

2.2.3.6 Favourites

Comments made about favourites include:

- It is unclear why the format of buttons for new Favourites should be different. It might be better to just extend the grid of existing favourites.

- Adding to favourites needs an option to cancel (+ speech) using icons. Delete from favourites needs 'are you sure' (+ speech) using icons. (Possibly just ✓ and X.)

- There should be an option to view thumbnail graphic of page to associate with a favourite (and also to choose an alternative graphic, i.e, need to be able to associate any image with a favourite site).

- It should be possible to associate an image with a favourite site in the Editor.

- Larger favourites might be needed if automatic thumbnail generation was also used. Note also there is also the issue of updating the home page thumbnails if the page changes. However, there is some concern that using home pages in this way also has implications for loading times.

- Selecting a favourite could also take you to another sub-group of favourites in order to expand the number of saved favourites available to the user. Note: some concerns about increased complexity with this added functionality.

Recommendations:

When adding new Favourites, extend the grid of existing Favourites, rather than providing a different format at the bottom of the page.

When adding or deleting Favourites, provide an option to cancel.

Make entire button (image and label) the hot link.

Provide the option to create a thumbnail graphic of a page in order to associate it as a favourite.

The Editor should enable the user to associate any image as a favourite on their Home Page.

2.2.3.7 Speech Mode

Comments made about speech mode include:

- Currently images are ignored in speech mode. Note: it is assumed that in the future the Alt tag will be read and the user advised that it is an image that is being described.
- It should be possible to edit the pronunciation of common words in the speech engine to provide more correct pronunciation where needed. This would be important for teaching language skills.
- It should say ‘Link’ before and not after the text.
- Could punctuate a number of links by saying ‘Next Link’ each time while reading the link text.
- There should be an option to speak the link in a slower voice to the main text reading.
- There should be speech feedback of interface dialogue boxes.
- Auditory feedback would be useful if you tried to activate a function, etc., that is not valid for the operating context.
- A ‘stop reading’ function would be useful (in ‘speak paragraph’ mode).
- Users may like a ‘speak all’ button in addition to no speak / speak word / speak paragraph.
- Repeating current highlighted text by pressing ‘speak previous’ button may be confusing for some. Change button label from ‘Previous’ to ‘Repeat’.

Recommendations:

The Browser must read the Alt tag for each image and inform the user accordingly. One option would be to say ‘image’ followed by the alt description. A different voice from the main body of text would also make the distinction clearer.

When reading the links, the speech should say ‘Link’ before and not after the text and speak the link text in a different voice from the main body of text. There should also be an option to speak the links in a slower voice to the main text reading.

Provide speech feedback of all interface dialogue boxes (if speech is switched on).

Provide some auditory feedback if the user tries to activate a function that is not valid for the operating text.

Provide a ‘stop’ and a ‘continue reading’ function when in ‘speak paragraph’ mode.

In addition to the no speak / speak word / speak paragraph modes, provide a ‘speak all’ mode.

To repeat text, the button should be labelled as ‘Repeat’ rather than ‘Previous.’

2.2.3.8 Input

Comments about access include:

- It should be possible to set up the browser so that icons are also read when the mouse is moved over them (‘auditory fishing’). An ‘auditory fishing’ function for links and headings would also be useful for pointer users (as a pointer dwell function or right mouse click).

- GUI interface useful for people with learning difficulties, visual impairment, reading difficulties, difficulties using a pointer accurately.

Recommendation:

Provide an ‘auditory fishing’ option whereby button labels will be read aloud when the mouse is hovering over them.

2.2.3.9 Symbol Support

Comments made on symbol support include:

- The potential to load symbols instead of icons, e.g., PCS, should be considered

- Licensing issue for use of commercial symbol sets needs to be resolved to allow a user to toggle between the AAC and the PC. We need to consider ways forward. For example, is it appropriate to agree a common set of application symbols that could be used for e-mail and web browsing? If these were offered copyright free to manufacturers, it would facilitate

interoperability. The common symbols could then already be pre-taught. WWAAC developed or joint workshop with manufacturers?

- There should be a draw function, in order to add or to modify symbols. Need to give instructions on how to make these changes.

- The speech mode should also operate when summary pages are presented in symbol form, i.e., symbol to speech.

- Consider symbol embellishment of text through the use of pop up symbols that appear as a word is highlighted. Possibly the equivalent of a magnifier to highlight those words that have a symbol associated with them (so that the users are not frustrated by trying to find a symbol not in their database).

Recommendations:

Symbols licensing issues require consideration.

Provide a simple drawing function in order to add or to modify symbols.

Provide instructions on making changes to symbols, possibly within the Editor.

Ensure that the speech mode will also operate when summary pages are presented in symbol form (i.e., symbol to speech).

Design and test possible ways of providing symbol embellishment of text (e.g., using pop-up symbols that appear as a word is highlighted, either above the word or in a separate window).

2.2.3.10Summary Page

It was agreed that limited text could be translated into symbols, and that translation of abstracts, titles and keywords could be useful. An idea discussed was finding some way that key words in the text could be flagged and graded so that the summary could pick them out and provide them in symbol form if required. This might be relevant to the web authoring tool.

Currently the links on the summary page take the user back to the host page summarised rather than to the links destination. We may want to be able to set this up so that the links take the user to the new pages (also displayed in summary mode).

Recommendations:

Discuss ways of identifying key words in the text, flagging, grading and extracting them so that the summary can select them for symbol translation.

Discuss the possibility of links in the summary page taking the user to the new pages, rather than back to the host page. This may be a browser set-up option.

2.2.3.11Settings

Comments made about settings include:

- The layout depends on the sophistication of the user.
- Some users will need to be able to configure the scanning for themselves.
- Facilitators need to be able to lock the settings for some users.
- Need to be able to test the settings while in the settings window, e.g., voice rate and characteristics.
- From the settings menu, how do you add graphics for favourites?

2.2.3.12Editor

Comments made about the Editor include:

- If the Editor is more than just for the simulator, then much work needs to be done on it. Expect that it will change dramatically for the alpha version, and the following notes are made with this in mind:
    - Would be simpler with an add-button function
    - Drag and drop preferred for button positioning
    - Would need a help file
    - Swap red / blue = enigma
    - What do the green toggle buttons do?
    - What does key capture do?
    - Could use drop-down menus for some item settings, e.g. button configurations

Recommendations:
The layout Editor must be very simple to use but also be flexible, allowing the number of buttons, their positioning and glosses to be adjusted using a simple drag and drop interface. It should also be possible to save and load custom configurations.

Provide a training package (paper-based and on-line as local files).

Provide a link from the Help facility to the training module.

2.2.3.13General

More general comments made include:

- Provide a special 'kite mark' to indicate symbol accessibility (similar to 'This software can read Bobby Level 1 compliant pages').
- Facility to launch external communication, e.g. to email, from the Browser.
- Facility to 'Tell a friend' about this web site and send the URL to them (a link to email would facilitate their communication).

Recommendations:

Provide a facility to launch email from the Browser.

Provide a facility to 'Tell a friend' about the web site.

2.2.3.14Interface Design

Comments about interface design include:

- Highlighting sometimes makes reading difficult on a particular background.
- Application to automatically select appropriate colours.
- A facility to change background colours and switch off background images.
- Use colour coding for grouping the navigation buttons, e.g., link buttons in one colour and text buttons in another.
- Higher contrast needed between button and background (and use of borders to differentiate buttons from each other).
- Greater emphasis could also be given to the text being read by having the option of switching off any background image. Some thought could also be given to its magnification.
- Consider highlighting the text being read without the border being placed around it. Alternative options proposed include:
    - Selection area frame width + no frame
    - Selection area transparency
    - Spoken frame width + no frame
    - Spoken area transparency
- Also consider magnification of this text window (as opposed to symbol embellisher) and ability to switch magnification on and off. Possibly by hovering over the word or icon to read it. This window would also benefit by having a facility to switch off the pages background image in this window.

Consider something similar to AutoZoom (as in DynaVox). Note: Possibly for use with word, paragraph or symbol in magnification.

- Need to be able to block off the settings button and access the functions via an editor for some users.

Recommendations:

Provide the ability for the application to automatically select appropriate colours for the visual focus.

Provide a facility to change background colours and switch off background images.

Use colour coding for grouping the navigation buttons, e.g., link buttons in one colour and text buttons in another.

Provide higher contrast between the button and the background (and use borders to differentiate buttons from each other).

Consider highlighting the text being read without the border being placed around it.

Alternative options proposed include:

- Selection area frame width + no frame
- Selection area transparency
- Spoken frame width + no frame
- Spoken area transparency

Consider magnification of this text window (as opposed to symbol embellisher) and ability to switch magnification on and off, possibly by hovering over the word or icon to read it.

2.2.4 Outcomes

As part of the iterative process of software development, the findings from this activity were fed into the further development of the simulator before it was evaluated with end users. A number of refinements were incorporated into the design of the simulator.

2.3 User Evaluations: Preliminary

2.3.1 Introduction

Following the evaluations with experts, evaluations were also conducted with 9 users, all with Cerebral Palsy, from the UK, the Netherlands and Sweden.

In the UK, the IT Co-ordinator and the Research Co-ordinator from the users' college were also present during the evaluation; in Sweden, 2 parents, a grandfather and a speech and language therapist were also present; and in the Netherlands, a Therapist accompanied two of the users and her mother accompanied the third user.

All the facilitators show a great deal of interest and also made comments where appropriate.

2.3.2 Preliminary Users

Three users were involved from the Netherlands, three from Sweden and three from the UK. More detailed information about the users is provided in Table 2.1 below.

Country	M/F	Age	Impairment	Experience with the Internet	Input device to PC	AAC system*
NL	M	15	Cerebral palsy	Yes	Mouse	Symbols (Bliss)
	F	15	Cerebral Palsy	Yes	Mouse	Symbols (Bliss)
	F	15	Cerebral palsy	Some	Mouse	Symbols (Bliss)
SE	F	14	Cerebral palsy	Yes	Mouse	Symbols (Bliss)
	M	18	Cerebral palsy	Yes	Joystick	Symbols (Bliss)
	F	12	Cerebral palsy	Yes	Head mouse	Symbols (Bliss)
UK	M	18	Cerebral palsy	Yes	Mouse/ Keyboard	Text
	F	19	Cerebral palsy	Yes	DiscoverSwitch with mouse options	Symbols (LLL**)
	M	35	Cerebral palsy	Yes	SAW	Text

* Symbols = Symbol based AAC
Text = Text based AAC

**LLL = Language Learning and Living (Minspeak)

Table 2.1. Summary of Users Involved in the Preliminary User Evaluations.

2.3.3 Procedure

Detailed procedures for user evaluations in the simulator study can be found in Section 5.2 of Deliverable 13. The suggested methods and tools were however, for guidance only, and adaptations were made to the needs of individual users and the evaluation setting. The computers in each evaluation setting were also prepared with the appropriate English, Dutch or Swedish speech synthesisers which were Microsoft SAPI 4 or 5 compliant.

In the UK, the evaluation was conducted with two users at the same time, and the browser was on a wall. Key functions were demonstrated to the users, inviting

comments along the way. Since one of these 2 users was able to communicate without the use of AAC, most comments from this evaluation related to his impressions of the software.

The duration of each session ranged from about 1 to 1 ½ hours, and the procedure followed the general steps as outlined below:

- Introduction to the user
- Demonstration of the basic browser functions
- Usage scenarios
- Short user interview

An additional UK based evaluation involved a home visit to a switch user. The central functionality of the browser was demonstrated and explored in person by the switch user

The following represents a summary of all the results of the preliminary user evaluations. The results of the two User Workshops at the ISAAC 2002 Conference in Denmark and the Communication Matters Conference in the UK are treated separately.

2.3.4 Findings

First impressions of the software were very favourable, both on the part of the users and the facilitators. The software was seen as a significant step forward from a more conventional browser and it was felt that many users could become more independent as a result. Users said that they liked using the software, that it was easy to use, and that they would like to have the software on their own computers.

2.3.4.1 Speech Mode

Users found it very helpful when text was read out, as well as being able to see it on the screen; in fact this was the feature which users were generally most enthusiastic about. These particular users were not interested in the speech output word by word.

Symbol enhancement of text was also seen to be of value. A more able user reported that he was unable to read the text at all without the pictures, and a Bliss user also found it difficult to read Bliss sentences without speech support. Note, however, that there were clearly some issues regarding the potential ambiguity of symbols, and the possible need to have a display tailored to an individual's own symbol vocabulary.

A more able communicator also clearly felt that he needed speech recognition software to help compose text, and was investigating the different possibilities by himself.

Another user, very experienced in surfing on the Web, now uses 'Doc Reader' for her speech output. However, she was very enthusiastic about pointing to the word or sentence with the mouse and using one of the speech buttons on the left side of

the screen. A good Dutch synthesiser is necessary (e.g. 'Laura' from TNI or Fluent Dutch).

It was felt by some users that speech output of the text on the page was very important, but that the other speech support i.e. spoken links and button labels, were less important.

Problems with the speech synthesiser caused some confusion for the 3 users in Sweden. Because of the limited clipboard speech support, the visual focus to the web site (the frame or word cursor) was not synchronised with the speech output—it was stepping through the text too quickly—and the users therefore had problems keeping track of the focus of the speech. There were also problems with the dwell function combined with the head mouse. The browser window, and web page content, did not have sufficient "passive areas"—leading to many unintentional and confusing selections of content for speech output, as well as link activations. This is a problem with the current implementation that needs to be addressed in future versions.

Recommendations:

Explore the use of symbol enhancement of text.

Ensure that the visual focus to the web site (the frame or word cursor) is synchronised with the speech output.

Ensure that the browser can be set up so that the interface presents large targets for those using head pointing devices. Being able to configure the interface so that control buttons are large and well separated is particularly important for this group.

2.3.4.2 Symbol Support

The browser's use as a teaching aid was emphasised. Additional functionality may be required to support this. For example, it was suggested by one of the experts that a 'spider gram' of symbols could be used to organise the browsing task or illustrate the various lessons or files that could be accessed that lesson.

Examples of how the browser could be embellished with symbols were presented to users. The following comments on symbol support refer to these examples:

- Symbols and images were appropriate for use in the summary page.
- There should be an option to switch on the symbols only if and when you wanted them.
- The Web browser illustrated highlights the text as it is read and provides a translation into symbols that appears in a window at the top of the screen. One option would be to directly include symbols above each word of the text version of the page. (In fact, when some of the users in a separate evaluation were shown another symbol-supported web site, they said that they did not like it when the symbols were presented separately from the text).

- The window containing the symbols in the summary page could be put in a different colour to distinguish it from the main part of the page.

- Some of the symbols were considered confusing, as they sometimes represented concepts and not individual words, e.g. fin (fish) was used for 'final'. Therefore, speech mode was also crucial to interpret the summary for these users.

- Symbols could also be used to provide titles for text entry boxes, e.g., the use of an 'envelope' icon to indicate that the next window was for entering the web page URL.

Recommendation:

Investigate and evaluate methods of symbol embellishment for browsers and web pages. Note: translation of large and complex web pages into symbol form is not considered feasible or appropriate given the limitations of most symbol systems and readers.

2.3.4.3 Summary Page

Some search engines already produce summaries of pages and it was suggested that an examination of these could be of use for the project.

Recommendation:

Investigate and evaluate further ideas for producing automatic summaries of web pages either based on an analysis of existing page content or by the use of meta tags within the pages. As a minimum the possibility of displaying titles, links, keywords and existing abstract should be considered.

2.3.4.4 Favourites

The concept of the Favourites page was very well received by the users, who found it easy to recognise their preferred sites. They found that it was faster to use than searching in the 'normal' favourites list. One user specifically said that it made the browser "very good looking". Examples of favourites that the users especially enjoyed were the jokes and the zoo (which was very interesting for one user in particular); however, some users commented that they would like more sites to access, for example, the sites which they talk about on television.

One AAC user was clearly very enthusiastic about the fact that a photo could specify her favourite web sites and that she could save further web sites in this way (e.g. favourite pop stars). Her reaction to this was "Cool".

Another user would like to see a desktop folder of 'Work' as one of his Favourites. Note: There was potentially some confusion in this user's mind as to the distinction between creating word documents and browsing the web. However, we may also

need to consider how to easily port information between word processing, web browsing and e-mail applications.

This particular user also suggested Webmasters should provide a symbol, logo, or a thumbnail image to be used by adapted Web browsers as an alternative presentation in the Favourites list. Therefore, when the user adds a web page to the Favourites list, this would also appear automatically.

Recommendation:

Explore the automatic generation of icons for the favourites page.

2.3.4.5 Use of Icons

On the whole, the users found that the icons used in the default setting were clear and easy to understand once their meaning had been described. Buttons specifically mentioned as well liked were Home, Read Next, Read Previous/Repeat and Summary. Some users commented that they did not think the particular symbols on the buttons were very important. It was noted however that inexperienced users might benefit from having a limited number of control functions and buttons to choose from. Specific comments about the default icons used included:

- The icon for 'STOP' (the WWAAC symbol) was not at all obvious to the users. It was suggested that a traffic stop sign be used instead.
- The icon for 'Settings' was thought to look like a diamond ring. Again this was confusing.
- The icon for Link was also confusing, as it did not represent the action of going to the page.
- The alternative set was not evaluated in detail. However the following comments were made:
    - The alternative link button be improved by contrasting the colour of the triangle and the line, with the line being blue reflecting the link underlining in the text.
    - The clock used in the back and forward buttons was thought to be confusing.

Recommendation:

Evaluate the button icons with users and adapt/redesign where necessary. Also look more closely at the icons commonly used on AAC devices.

2.3.4.6 Functionality

Some users had problems with the scroll function not working properly on some web pages, and this should be investigated.

2.3.4.7 Input

Users who were able to utilise a mouse for input preferred to do so rather than using the browser buttons. One option to consider in the future for some users would be an even more direct input device such as a touchscreen.

It was clear that the keyboard interface needed to be operable by single key presses as only one user was able to operate two keys of the keyboard simultaneously due to poor hand function.

One user commented that the software should be easier to use with a head mouse.

One possible switch user interface was also proposed. The following functions considered to be used most frequently could be clustered at the top of 2 columns. For example:

Speak next	Enter link
Scroll up	Scroll down
Next link	Previous link
back	forward
Speak previous	Save to favourites

Other suggestions include:

- A toggle switch to easily switch the scanning interface on and off.
- Being able to position the selection set to different parts of the screen.
- Providing an easy to use editing facility for the switch interface (essential to customise selection sets to individual needs).

Recommendations:

Ensure that all input media, including the keyboard and head mouse, are supported.

Consider a touchscreen as an alternative direct input device in the future.

Provide a toggle switch to easily switch a scanning option on and off.

Provide scanning as a built in option as well as the provision to used third party scanning software such as SAW.

Develop a better default setting for scanning entry.

2.4 User Evaluations: ISAAC 2002 Workshop

2.4.1 Introduction

A workshop was held on 13 August during the ISAAC 2002 Conference, Odense, Denmark, in order to provide an opportunity for users to view and then try out the simulated web browser developed by the WWAAC project. Users had been invited to attend this workshop in a number of different ways: through a meeting of the user forum at ISAAC, announcements at the project's paper presentations during the conference, and through personal contact.

2.4.2 Users at ISAAC Workshop

In total seven users made use of the simulator. One person (who probably had a diagnosis of ALS or Amyotrophic Lateral Sclerosis) agreed to use the browser from his own home when he would be able to connect his own software for eye control, although never went on to use it. However, he was given a demonstration and his comments are included below. Another person watched the demonstration but decided not to try the simulator as a head mouse would be needed.

More detailed information about the users involved is provided in Table 2.2 below.

Country	M/F	Age	Impairment	Experience with the Internet	Input device to PC	AAC system*
UK	M	21-30	Cerebral Palsy	Yes	Mouse/ keyboard	Text
SE	F	16-20	Cerebral Palsy	Yes	?	?
DK	M	21-30	Cerebral Palsy	Yes	Trackerball with feet	Symbols
DK	M	51-60	ALS	Yes	Eye control	Text
DE	F	16-20	Cerebral Palsy	Yes	4 switches	Text
DE	M	16-20	Cerebral Palsy	Yes	Keyboard	Symbols
IT and USA	F	16-20	Cerebral Palsy	No	2 switches	Text
Israel	M	16-20	Cerebral Palsy	Yes	2 switches	Text
So. Africa	M	21-30	ALS	Yes	Mouse/ Keyboard	Text

* Symbols = Symbol based AAC
Text = Text based AAC

Table 2.2. Summary of Users Involved in the ISAAC Workshop.

2.4.3 Procedure

Detailed procedures for user evaluations in the simulator study can be found in Section 5.2 of Deliverable 13.

Users, along with their facilitators, visited the workshop for varied periods of time over the course of the day. The software was first demonstrated to the users, either individually or in groups of 2-3 at a time, and this took about one-half hour. The Browser 1a-topLeftX was used as the default configuration during the evaluation; however, other possible configurations were demonstrated to show the possibility of using different icons, and the ability to choose the best possible configuration to meet the needs of individual users.

Following the demonstration and questions from users and facilitators, project experts then set up computers (3 workstations were available) to meet the specific needs of the individual users, i.e., to enable the user to access the computer via his or her own switches, or input devices. For example, one switch user was using the ERIC prototype communication system.

The users then had 'hands-on' experience for at least one-half hour, but usually for much longer, depending on their other commitments. The project's workshop facilitators were there to answer questions and observe the users' behaviour and interaction with the system. The only real difficulty during this time related to the fact that users did not want to stop using the simulator and the project partners needed to ask them to finish in order to make room for another user!

2.4.4 Findings

The following specific comments were made by the users, their family or facilitators. These have been used to formulate recommendations:

2.4.4.1 Speech Mode

Users found that one of the best aspects of the simulator was that it reads out everything, even the text on the buttons.

It was also important that a visual focus to the web site was provided as well as the speech and that the two were synchronised.

The comments of a user with dyslexia confirmed that the WWAAC browser was very useful to support people with reading difficulties. Although this particular user could read, he found that the speech support helped him improve his reading comprehension and confidence. He suggested, however, that it would be helpful when reading the text if the voice could change during the text reading when it reached a link. Note: The simulator still reads a link and then says 'link' afterwards rather than prior to reading the link, but this may be less of an issue if a different voice is used.

Recommendations:

Provide the facility in speech output for the voice to change when it reaches the link.

Explore option of the browser saying link before rather than after the link text.

2.4.4.2 Symbol Support

No specific comments were received apart from the observation that the user's own symbol sets should be supported.

2.4.4.3 Summary page

Users and their facilitators considered the summary page a potentially very helpful feature even though in the demonstration this feature was very rudimentary. There was some agreement that having an abstract and keywords to describe the web content could be useful. No other specific suggestions were made as to added features of the summary page, but it was clear to the observers that the summary was still too text-based for some users and would benefit from symbol support. Some way of identifying critical images to use in such a summary was therefore needed within WWW pages. Note: we may therefore need to provide a tag that is used to highlight the most salient images on a site (see also the Section on favourites).

Recommendations:

Investigate ways of reducing text and providing symbol support within the summary page.

Identify ways of identifying critical images to use in a summary.

2.4.4.4 Favourites

It was not clear where new favourites would be listed on the favourites page, and providing a list below the matrix of favourites was also difficult for the users to understand. We may also need a way of automatically creating a 'thumb nail' image of a site to be used as an icon in the favourite menu. It may also be necessary to tag site images for use in this way within the mark up language used.

Recommendation:

Provide the option to view thumbnail graphic of page in order to associate it as a favourite.

2.4.4.5 Compatibility

There is a need to set up communication between the user's own AAC device and the computer before the web browser can be accessed. The parent of one user indicated, however, that he could imagine that his daughter's own communication program would work well together with the software, and in fact, she would prefer to use the row/column scan from her own AAC system.

Recommendation:

Ensure that the browser can communicate with the user's own AAC device, but also that the browser can act as a standalone system.

2.4.4.6 Use of Icons

It was not always obvious what all of the icons meant; however, it was felt that most would become easier with experience. Given the time limitations, it was not possible to conduct a full evaluation of the different sets of icons.

2.4.4.7 Functionality

For one user, the standard computer keyboard had to be fine tuned to his particular needs. This user expressed a preference for this to be a feature configured within the WWAAC software rather than it being set up through the general accessibility features of Windows. This also raised the question of having user profiles to allow multiple users of the same machine.

The browser's functionality could also be extended by allowing it to open and read simple text documents.

The application needs an on-screen volume control so that this can be adjusted without having to go into settings. Where speech parameters were being changed, e.g. reading speed and voice, it was also recommended that the user should be able to test them before leaving the settings menu.

It is necessary to be able to set up different reading speeds for text and links (links need to be read slower).

Some integration with simple e-mail services would be useful, e.g. being able to post a URL to somebody else easily.

There was a need to provide support for entering URL's and text for search engines. This would also be required for other interactive services such as on- line shopping.

Recommendations:

Consider the accessibility features of keyboards making this a feature of the WWAAC software, rather than having to be set up through the general accessibility features of Windows. Note: individual profiles would need to be saved.

Consider extending the functionality of the browser to open and read simple text documents.

Provide an on-screen volume control so that speech levels can be adjusted without having to go into settings.

Provide the facility to test speech parameters, e.g. reading speed and voice, before leaving the settings menu.

Provide the facility to set up different reading speeds for text and links (links need to be read at a slower rate than other text).

Investigate the integration of the browser with simple email services, e.g. posting a URL to somebody else.

Provide support for entering URL's and text for search engines.

2.4.4.8 Buttons

The project chose to use the Browser 1a-topLeftX as the default configuration using the ACE buttons at this workshop. In later evaluations, however, more consideration will be given to alternative or preferred icons, as well as configurations for different user groups. It was also suggested that more work could be carried out to make icons consistent with other AAC software. For example, one person expected to see the help function associated with a medical symbol. However it is not clear whether the user concerned was confusing the help function in the browser with the more generic call for assistance common on communication devices.

2.4.4.9 Navigation

No particular problems were observed but it was suggested that some way of improving access to links on web pages should be considered. The current cycling through links could be unwieldy for pages with a large number of links, and some shortcut might therefore be desirable. One option would be to introduce a numbering system for links and allow the user to jump to the link required directly.

Recommendation:

Investigate ways of improving link navigation on pages with large numbers of links. Note: making the scroll function move the focus for selection would address this issue.

2.4.4.10Input

The computers were set up to meet the specific needs of the individual users, e.g., to access the computer via head mounted switches. For example, one user had the right switch enabled to read through the text and left switch to move through the buttons. In explaining this configuration, the user's father suggested a helpful way to reinforce this to his daughter: 'Left moves and Right does'. It would be useful to establish basic guidelines for connecting switches to the WWAAC software.

Connection proved to be straightforward, but the default scanning interface provided by the browser was somewhat unwieldy. As configured, the user has to scan through the whole selection set in order to use the system effectively. This meant that an optimal scanning strategy could not be adopted.

For example, one user, who kept missing the required button for within-page navigation, would have preferred to bypass the row of buttons across the top of the screen to get back to the required button more quickly. Another user also found it very slow to go back to the 'Next Link' button.

It was also not possible to set up switch sets for users using specialist access software such as SAW during the demonstrations and this needs to be looked at in the future.

Recommendation:

Investigate more suitable scanning interfaces for the default browser.

2.4.4.11Settings

It was clear when observing the users that they all had particular needs that should be accommodated by providing differing configurations of the software. Being able to provide customised labels for buttons was seen to be a good idea, and for some users it was clear that fewer control buttons were required. It was concluded that more work was needed to develop a small number of default configurations that could be suggested as a starting point for particular user groups.

Recommendations:

Ensure that labels on buttons can easily be customised.

Develop a small number of default configurations that can be suggested as a starting point for particular user groups.

2.4.4.12Training

It was suggested by one of the parents that a 'canned demo' be provided along with the software which would demonstrate not only the functionality of the buttons but also, for example, moving to sample Web links. It was also suggested by another user that a Help button was necessary.

Recommendation:

Provide a Help facility.

2.4.4.13General

One user found that it would be simpler to have just a text version of a web site and ignore the graphics. This feature could be built into the design of the web site itself, and webmasters could enable graphics to be turned off to facilitate access for those who benefit from text-only web pages. However, we may wish to consider additional ways of achieving this functionality on web pages that do not have this feature built in. Being able to switch off images (background and images used on sites) could be a useful configuration feature, both for web pages and any enhanced summary containing images.

It was also suggested that pop-up windows should be eliminated as switching between active windows is difficult for AAC users. When they appear AAC also users have to be advised how to get rid of them.

Other suggestions made by the users and their facilitators or family included the following:

- How will the WWAAC browser deal with Shockwave?
- How do you quit out of the Browser? (The user's words were "I see no way of turning it off.")

Recommendations:

Provide a facility for switching between active windows.

Consider ways of advising users how to remove pop-up windows when they appear.

Provide a facility to quit out of the Browser.

2.4.5 Conclusions

Users were generally very enthusiastic about the WWAAC browser, not only about the accessibility features for switch users, but also about the facilities available to support reading skills. When asked whether he had any suggestions, one young man just asked, "When will it be ready?" which reflected well the users' overall attitudes to the prototype.

Following the workshop, the Workshop facilitators held a meeting to discuss the outcome of the day and how the recommendations of the users and their facilitators could be fed into the development of the alpha version of the prototype system. It was agreed that the project was on the right track, but that the users' comments could lead to further improvements.

Throughout the observations, it was also evident that large chunks of text were difficult for some AAC users to deal with, and different elements, in smaller chunks, should be made accessible to them. It should be possible for users to access elements of the web page in small enough chunks for their own ease of use. These and other recommendations will be discussed and assessed during the evaluation of the prototype browser and will feed into the development of guidelines to make the Web more accessible for AAC users (see Deliverable 12A Guidelines for Developing an AAC Enabled World Wide Web).

2.5 User Evaluations: Communication Matters Workshop

2.5.1 Introduction

This Workshop with users was held at the UK AAC Conference Communication Matters, Lancaster University, on 17 September 2002.

Four AAC users were involved in the two-hour workshop. This included a demonstration of the WWAAC browser followed by an opportunity for participants to operate the software for themselves. Two users used the WWAAC browser with scanning interface (a switch input system with SAW selections set), and the other two used a trackerball. Informal interviews took place after the usage sessions. A description of the users is given below.

2.5.2 Participants

Four users were involved in this UK-based workshop. A summary of the participants involved in is outlined in Table 2.3 below:

Country	M / F	Age	Impairment	Experience with the Internet	Input device to PC	AAC system*
UK	M	21-30	Aphasia	Yes	Trackerball and 2 buttons**	Text
UK	F	8	?	No	Joystick	Text
UK	M	16-20	?	Yes	Special mouse**	Symbols
UK	F	16-20	?	Yes	**	Symbols

** uses head pointing device for AAC

Table 2.3. Summary of Users Involved in the Communication Matters Workshop.

The young adult male (age 21-30) is able to access a computer via a trackerball and up to two control buttons. He would probably benefit from accessing the browser directly using this established access method, with a restricted set of buttons. At the workshop, he used a head mounted pointer to operate his communication device and control his wheelchair. He was enthusiastic about the software, and found the speech output particularly useful as he is a poor reader. He also thought that providing a summary page to help sifting through “rubbish” would be very useful.

Note: he is very interested in being able to send and receive text messages to mobile phones and the Lycos messaging service was demonstrated (http://sms.lycos.co.uk/mobile/)

The young girl (age 8) is able to access a computer via a joystick. She is able to directly operate her communication aid (Delta Talker). She is clearly a bright child, and has good reading skills. Due to her accuracy, the provision of large targets was less important for her. Text-to-speech output was also not so important for her, owing to her high reading skills. She was accompanied by her parents and they expressed an interest in getting involved with the project further.

The teenage male (age 16-20) accesses the computer using a special mouse, but finds this difficult to use. He uses a head pointing device to access his DeltaTalker Communication Aid. He was very enthusiastic about the software describing it as "quick, fast and fantastic". The speech support side of the browser was important for him, and he was also of the opinion that the software should operate as a stand-alone product and support e-mail. He cannot use e-mail for himself and has to rely on his careworker (described as being lazy). He wanted to know how much it would cost and was also concerned that it should not be more expensive for a switch user. He wanted to be involved with the WWAAC project but there were some questions about timescales and his availability. One of his teachers was also present and suggested we contact her to assist in the process of getting him involved.

The teenage female (age 16-20) accesses a Pathfinder communication aid via a head pointer. She expressed an interest in getting involved and could act as a consultant to the project, organising a regional workshop. She thought the software was good and would be useful particularly if it could be accessed via her Pathfinder. Whilst they had a PC at home, it is fairly limited, and does not work reliably owing to the presence of a virus.

In addition to the above, a teacher from a UK College was also interested in the project and would be happy to get involved, as there were a number of her 60 students who might be able to benefit from the software.

2.5.3 Findings

As can be seen from the specific comments above, all of the users were positive about the WWAAC software, and wished to continue working with the project. Some suggestions for improving the system were also received.

These include:

- Ensure that larger font is used for the text on the favourites page. Note: the issue raised here was that the favourites needed to be large targets so that they were easy to select for a person with poor co-ordination (currently the large icons are not selectable).

- Ensure that the system can be operated without additional software being needed. It should also be possible for a single switch user to operate it.

- Ensure that the software supports searching WWW sites and entering URL's.
- Cost of software seen as an issue for people with more severe disabilities — 'the software should not be more expensive than for a mouse user'.
- Integrate the email application with the browser application.
- Provide a summary page with an abstract of the site's content.
- Interest in sending and receiving mobile phone text messages.

Recommendations:

Ensure that the favourites are large targets (image and text size) so that they are easy to select for a person with poor coordination.

Ensure that the system can be operated without additional software being needed. It should also be possible for a single switch user to operate it.

Ensure that the software supports searching WWW sites and entering URL's.

Ensure that the e-mail is integrated into the browser (e.g. to enable a user to 'tell a friend' about a site via email).

Provide a summary page with an abstract of the site's content.

2.6 Evaluation of Inter_Comm Email Software

In addition to the evaluations conducted on the WWAAC project's simulated web browser, a demonstration of Wigit software's Inter_Comm VI was provided by four students at a school in the UK, in November 2001. This was took place as there was not a simulated WWAAC email package to evaluate with users.

Observations from this demonstration highlighted a number of important issues to be considered in the use of email for our target groups and will be used to inform the development of the WWAAC project's email application as the project progresses.

The pupils spend up to three years taking lessons in the educational unit we visited, which was located away from the main school. This is an ordinary house located in a residential area, close to public transport and shops. This allows pupils to develop and practice everyday living skills like shopping, cleaning and preparing meals. Some pupils also receive work experience training during the 3 years they attend the unit.

The unit has a number of PC's that are used for education purposes, and Internet and e-mail access had recently been installed. Inter_Comm, an email add-on for Writing with Symbols 2000, was running on a single modern PC connected to the Internet via modem with the Win2000 Millennium edition operating system installed. The PC had been installed for about a year, and the communication software since January 2001.

The pupils, all between the ages of 16-18, are encouraged to use computers for games, educational activities and more recently e-mail. Pupils were supported by a member of staff in using the software, but the more able pupils were also showing initiative in trying to use the software for themselves.

The teacher reported that the software had transformed the students' ability to communicate, and was very encouraged by the value of the software.

2.6.1 Interesting Issues

Whilst not reliant upon symbols as a communication medium as an alternative to speech, the symbols (Rebus) were used as an aide-memoire when reading and writing and used on a wide range of educational materials printed from the computer. Digital photos of the users and their correspondents were also used extensively and relied upon in their emails, e.g. to select the person to email and in the user's signature.

Text to speech was a critical feature, and one of the reasons they had not been able to browse WWW sites easily.

Implications:

We must support printing from our applications.

A wide range of people with learning difficulties may benefit from symbol support.

The applications need to be able to input and manipulate digital photos so that images can be shared and printed.

We are correct in viewing speech output as a critical aspect of the project.

2.6.2 Observations

Generally the software was well designed and relatively easy to use. However, there were some aspects that could have been improved.

2.6.2.1 Good Features of Inter_Comm

Inter_Comm has integrated text to speech that works well at letter, word or sentence level. It is also possible set text to be highlighted.

Inter_Comm's control icons have text labels.

Inter_Comm uses large icons for control of the application.

It is possible to import scanned images for use in Inter_Comm. Note: e-mail users are photographed and images of correspondents also put into a list of favourites. A digital camera is therefore really needed to get the most out of this application.

2.6.2.2 Less Attractive Features of Inter_Comm

Scrolling windows were used for display and navigation in Inter_Comm. Messages which required scrolling by the user were not scrolled which left some of the text/icon unseen.

The grid window for entering symbols was too small to read text labels easily. Note also that fixed size and non-overlapping windows were used. This meant that the application (e-mail message) window became small when composing messages. Perhaps it is possible to resize the grids, but it was not easily done or obvious how it could be done.

A large icon was used by Inter_Comm to indicate text messages were being sent or received, but the text labels included with this were very small. A dynamic rather than static icon would also have helped in showing the user that something was happening and they needed to wait.

When new messages are received—marked with a double exclamation mark (!!)—the user is taken to an in-tray that also includes a list of older messages—marked with a tick. The user then has to select an unread message from the bottom of the list. This does not appear to work very well as the user then has to actively find and select the unread incoming messages. In addition there may be display problems as the user's attention could be drawn to the middle of the screen rather than the bottom where the new messages are listed. For this reason design alternatives should be investigated, e.g. only listing new messages that have not been read. Messages in the inbox also did not appear obviously dated, and this might assist teachers/students in their support/organisation of email.

There can be some problems with automatic translation within Inter_Comm, as the software cannot deal with spelling mistakes in the incoming messages, and some words may not be in the system's vocabulary, e.g. slang terms. This means that incoming messages may also need some editing by hand (by the teacher) before they are printed. With this software incoming messages cannot be edited for mistakes in order to allow the pupil to read and understand it more easily. It could therefore be useful to have a feature to allow a message to be tidied up before printing or saving.

Line breaks can also create problems, as e-mail packages can put breaks in unusual places that interrupt the flow of the voice output.

Replies received can have the original message included, which makes them long messages for symbol users. Also there is inconsistency as sometimes the original message is at the start whilst at other times it is at the end.

It is not possible to cut and paste text into the application from external sources.

Attachments received are currently ignored by the application.

Adding attachments to e-mails is more complicated than it needs to be as the user has to browse for the image on their hard disk. This is also made harder by the

software not including an image preview feature to allow the relevant image to be easily identified without knowing its text name.

Setting up new user accounts within Inter_Comm is time consuming, as it is not possible to create and copy user templates that include the common configuration details.

2.6.3 Other Observations

Two of the users seemed to be having problems reading the screen. Note that a 14 inch display was used, and in some cases, e.g. symbol grid, the text associated with symbols was too small.

One user responded to the voice output as if it was a person, e.g. immediately answering questions that were posed by the text output message. This may have implications for how material should be structured for speech output for people with learning difficulties.

The software translates the message into symbols when they are available in that symbol set (either Rebus or PCS). However, where the match is not exact, the software in some cases will choose the nearest match (for example, the symbol for 'cut' inserted for 'cute', and the symbol for cod inserted for 'code'). With the assistance of a facilitator, this was no problem and it was something to joke about. However, if a user with a learning difficulty were trying to read an email independently, this could cause confusion.

Junk mail can be a problem for this user group, as they may not understand that messages sent them that are not personal and intended just for them. This may mean that an aggressive filtering policy is needed in some cases, only allowing messages from authorised sources to be let through. We may therefore need to consider some administrative features allowing filtering alternatives to be set up. For example, one option could be for all new e-mail sources to be vetoed by the teacher, and once authorised this source would then be allowed to send messages directly to the user.

The symbolised messages appeared cramped - even simple messages looked visually complex. For example, the spacing between lines was not immediately obvious so the page often looked like an unbroken mass of symbols and words (perhaps leading to increased reliance on text to speech).

It may not be obvious to users where exactly they are in the system (in-box, out-box, etc.). This information can be inferred from the function buttons on the right but does not appear immediately obvious. Perhaps colour coding or clear labels might help.

Students needed considerable support in message construction, and tended to write to either family members or the deputy headteacher. The teacher/facilitator commented on the need to 'maintain the momentum' in email use and she was engaged in seeking a range of communication partners for the students.

2.7 Conclusions from the Simulator Evaluations

This Section has described the results of evaluation activities carried out during the development phase of the simulated WWAAC web browser. The evaluations consisted of three components: expert evaluations, preliminary user evaluations, and user workshops (ISAAC and Communication Matters). There was also an evaluation of Inter_Comm email software.

The initial impression of the simulator browser software by experts was very favourable and it was perceived to be much better than other Web browsers for these user groups due to its flexibility. Specific concerns were addressed, and the robustness of the software was improved before the trials with users could begin.

Preliminary evaluations with users also confirmed that the software was a significant step towards independent use of the Internet by AAC users. More specific comments were then made by users, their facilitators and family at both the ISAAC Conference and Communication Matters. These workshops confirmed the importance and the benefits of particular features of the WWAAC browser, including:

- a graphical based, easy to use Favourites page
- speech output, synchronised with the visual focus on the screen
- a summary page enhanced with symbol support
- compatibility with the user's own switch(s) or AAC system, and
- flexibility to configure the interface to meet the needs of individual users.

Not only have these evaluations led to further developments of the alpha version of the prototype software, but they will also feed into the development of guidelines for web designers to make their web sites more accessible to AAC users.

Similarly, the implications gathered from the evaluation of Inter_Comm email software will be fed into the development of the alpha email application.

3 ALPHA BROWSER EVALUATION

3.1 Introduction

This Section summarises the results of the Alpha Browser evaluation, including results from four end users in the UK, two end users in Sweden, and one end user in the Netherlands, along with additional comments from teachers and facilitators. It was first produced as a 'Working Draft' in order that the technical developers would have early feedback from the end users and to implement their suggestions on an on-going basis.

The detailed methodology can be found in Section 6 of Deliverable 13. Given the considerable variation in abilities of our primary target users, in addition to variation in an individual's performance over time, it has been important to accept that a certain degree of flexibility was needed in how the techniques are applied in each particular case.

Key points from end user testing and interviews with facilitators have been summarised under the relevant aspects of the functionality of the software. Recommendations or solutions from the end users or experts have been extracted to bring them to bring them more explicitly to the attention of the technical developers and to distinguish them from descriptive text and comments. Although these recommendations are open to discussion, all Technical Problems (3.3.20) need to be investigated before progressing to the production of the Beta version of the prototype.

Appendix 2 contains sample data demonstrating the completion of the usage scenarios. Appendix 3 has details the integrated results of the interviews with end users. Appendix 4 reports the detailed interviews with the Facilitators.

3.2 End users Involved in Alpha Browser Evaluation

A summary of the user profiles is included in Appendix 5, with 5 of 7 end users being symbol users. The 2 end users in Sweden and the 1 end user in the Netherlands were all using direct access. In the UK, there were two direct-access (mouse) users, and two switch users. Only 1 of the 7 end users had no experience in using the Internet, but all 7 end users needed to be supported in their access to the Internet.

All end users interviewed expressed enthusiasm and a willingness to continue testing the browser in the Beta phase, although it was noted that they may not all be available during the proposed evaluation period.

3.3 Findings

3.3.1 Speech Mode

On the whole the end users liked the speech facility, but it was noted that reading web site addresses and the use of symbols such as"<< …>>" in the display of

headings and separation of links was a bit annoying. User feedback and recommendations are given below:

- The synthesiser might help with learning to read – when the user hears the word and sees it at the same time
- End users liked the fact that the voice is different when it announces that there is a link, so you understand that you can go further from it.
- Difficulties were experienced in understanding the whole text when reading it all at the same time. It was sometimes good to start by reading words one by one, then changing to read the whole sentence or paragraph, that is, often changing between the different modes.
- There was a need to slow down the speech when they had problems understanding a word.
- There was a need to be able to stop the speech when required.
- One of the end users would have liked to have a 'Turn Page' button to continue reading on the next page.
- When a user accessed www.derbycity.com, the system did not recognise it as separate paragraphs, so on pressing Previous Paragraph, the reading started at the very top.
- There were some problems with trying to read links within text, as direct selection causes the link to be activated rather than read. We therefore need to find a way of dealing with this.
- There was some confusion by the lack of shared focus for link navigation and reading.
- There was some confusion when links were being read along with the text.
- A user began to use the 'next para' button intuitively to explore the contents of a web page. The reading out of long lists of links separated by "vertical bracket" caused him to laugh a great deal, as did the separation of links by "greater than greater than".

Facilitators' input:

- If you have a big body of text, it would be useful to select an area to read by clicking at the beginning, clicking at the end, then selecting read selection, with 'stop' and 'pause' controls.
- Perhaps the browser should have 'stop' as a generic stop button.
- The speech synthesiser was considered the most important feature.

- When clicking the right mouse button, it should also read the text of the buttons in the browser.

- If you have a large body of text, click a paragraph (end users could not select the text) and have it read.

- It should be possible to read the links if they are represented only by a picture and no text.

Recommendations:

It needs to be easier to change between the alternatives, perhaps separate buttons for the different choices.

The settings to change the speed rate of the speech synthesiser need to be available for the user.

There is a need for a pause/play toggle switch for the speech output either as an additional control or integrated into the browser control.

Using a book analogy for the navigation controls, rather than scrolling pages, could be explored.

It was suggested that one option could be Left mouse button to read, and right mouse button to select. (However, it was discovered that the implemented solution is Left mouse button to select, right mouse button to read.)

An implemented solution is that when in the middle of a text document, “next link” will take the user to the next link after the current screen position rather than starting from the beginning of the document.

The browser skipping links when in read mode, as an alternative to reading links in a different voice, could be explored. A user may want to select a link immediately when it is read in text mode, but cannot do this.

3.3.2 Summary Page

Below are some of the points raised by the end users about the summary page:

- It was considered easier to see the available links in the summary page.

- With one of the end users the Sky Sports web site gave a summary of the whole website rather than just for that page

- On one occasion it was found that the summary page highlighted 2 links at the same time which proved to be a bit confusing.

Facilitators' input:

- The summary page is a really good idea.
- The summary plays an important role in navigation for the non-reader
- It should be made possible to be able to search on the summary page for the next word, sentence, paragraph or link.
- Consider a numbering system for links whereby you would go to the summary page and scroll through to a particular target number or possibly use a number input system.

Recommendation:

It is necessary to investigate whether the summary provided to the end users should be of the whole website, for just that page, or for part of a page. This will be considered in the guidelines evaluation work.

3.3.3 Favourites

Below are some of the points raised by the end users about using favourites:

- The large icons on the page were appreciated by the end users.
- One of the end users found it easy to go back to his favourites page when he was lost. However, another user preferred to use the home button instead of the favourite button.
- Early in the evaluation, one of the end users (by direct access with the mouse) was able to use the Favourites or Home Page button in order to move onto another web site.
- For the user using the 1 switch auto-scan it was thought that the favourites page could potentially become quite unwieldy if many web pages are added to it.

Facilitators' input:

- To choose a picture for the favourites page it would be useful to have a feature which scans through all pictures on the website and you choose the one you want.
- There needs to be an easier way to add a favourite (including a picture).
- Make it possible for the user to add his own favourite.

Recommendations:

It needs to be easier to add a favourite site, for example with a button that adds both address and a picture.

One solution to the problem of a favourites page becoming unwieldy might be to put frames onto the favourites page to speed access via group settings. Alternatively, it could be possible to have the option of a category-based folder system for storing favourites on multiple pages. The latter option would mimic the way favourites can be stored on conventional browsers.

3.3.4 Icons / Symbols

The icons on the buttons during the evaluation were based upon the 'ACE' set of icons developed during the Simulator Study.

User feedback on icons / symbols includes:

- The possibility to have your own symbols system/chart integrated in the software was welcomed by the end users.
- There was a need for the icons to be made clearer, e.g. a more distinct stop sign, and speaking icons.
- It was found that the buttons along the bottom of the popup selector do not have any speech support or symbols.
- The end user using the 2 switch auto-scan seemed to find it difficult to remember to use the 'next link' button on the favourites page (although by the end of the afternoon he was able to locate this quite reliably).

Facilitators' input:

- Icons are a problem as they are not clear. It was suggested that we need a default set of icons but with the facility to import your own. Treat people as individuals with individual needs.
- All buttons have a generic shape, square with rounded corners; this is too similar. It may be more distinctive if the buttons are colour coded or have a different shape, e.g. mouth for speech icon, or speech with speech bubble with icon inside. They need to be more simplistic but they also should be transferable for the future. Different shaped buttons could also denote different types of functionality.
- The terminology and icons on the buttons have caused some confusion for the end users, e.g., Link, Page Up and Page Down. It is clear, however, that the system shouldn't stray too far from commonly used terms, but more work is needed here.
- The Print icon is also not clear.

- The text on the buttons was not translated into Dutch on every button. There were some symbols missing, and some symbols are not easy to understand. Maybe we should use well known symbols and colours.

Recommendation:

The buttons should provide clear visual cues as to their content so the icons should be made clearer. The uniform colour scheme is also difficult (although the buttons should not be differentiated solely via colour as not everyone is able to make use of this information).

3.3.5 Functionality

Facilitators' input:

- The product does need to be stand alone, i.e. have its own scanning utility. It was suggested that the best option is to be able to turn the scanning interface on and off so that you can use your own scanning interface if you want and hide the buttons on the software.

- It could be useful to have an on-line thesaurus/dictionary as the end users may encounter complex text.

- If the user doesn't understand a word, it would be nice to be able to mark the word with a bookmark and have it explained by somebody later.

- There is nothing dangerous happening when the end users click a button. It is a nice feature that the browser warns when a pop-up site is opened.

3.3.6 Input / Buttons

User feedback concerning input / buttons includes:

- Almost all of the help needed had to do with which button to use, but one of the end users said that the buttons were easy to use when he had learnt to recognise/know them.

- Three of the end users preferred to use the mouse directly in the page instead of using the buttons. Buttons used were for speech output. The end users needed some help with which button to use in the beginning but learned quickly.

- It was difficult to see that the paragraph-button had four different modes. Some end users understood the function but it was difficult for some to see the difference, as the layout of the buttons is too similar. Actually, there is currently no visual difference in the button between paragraph and sentence modes.

- It was suggested that there should be different coloured buttons for different functions, and that there should be symbols on the buttons 'Summary' and 'Frame'.

- Some difficulties were encountered in distinguishing between Next Link and Previous Link, and possibly it would aid comprehension if the Next Link button came first.

- Using the mouse was preferred to begin with; however, once end users became familiar with the 'Next Link' button, they found it easer to click on, rather than each individual link in a list.

- There was a need for guidance in re-reading the paragraph and then again in reading the previous paragraph again. Low reading skills meant that the end user needed to be directed to the Next Paragraph button. The user regularly had difficulty in knowing whether to select the Next Paragraph or Previous Paragraph button.

Facilitators' input:

- There needs to be the possibility to choose between different sets of buttons, to make the user's own layout.

- It would be a useful feature to be able to hide buttons. For example 'print' is an extra complication initially, although in computer club one particular user spends most of his time finding and printing pictures, so this is a good feature.

- Terminology should be customisable.

- 'Scroll up' and 'scroll down' should be renamed to 'page up' and 'page down' as that is in fact their function.

- In the current layout, the order of previous and next is inconsistent, i.e. next para, prev para then prev link, next link.

- The function of the buttons was discussed with the facilitator. For people with cognitive impairments, a site with easy favourites (using pictures as it is now) is very interesting. Reading the text is perfect, (if they can select pieces of text) but the other buttons are less important for mouse users. Working with these buttons may be interesting with the advances in eye pointing systems and cyberlink, etc.

Recommendations:

It should be possible to read out the text on the buttons with right mouse click.

Put the Next Link button before Previous Link button to aid comprehension and consistency.

3.3.7 Input – Switch / Selecting Links

Feedback from the session with the user who accessed the browser using a single switch with auto-scan includes:

- On the favourites page, if a single switch auto-scan user makes an error and goes to a site before or after the one he or she wanted, it was a very annoying to have to scan all the way through the favourites again to get to the correct one. This would also hold true on any long list of links. A setting whereby it would be possible to go back to where you were on the list would be helpful.

- An auto repeat on next link, etc., would help a single switch user scan sites.

- Because of the way web pages are constructed, the user often had to scan through long lists of links using her switch. This was tiring and time consuming. At times, the evaluator 'cheated' by selecting the link for her. The process was made even more time consuming by the fact that when the end user pressed 'next para' or 'next link' it would tend to auto scan on from these before she was ready to press it again.

- If you select 'settings' via switch, the switch user becomes locked out of the browser.

Feedback from the session with the user who accessed the browser using two switches includes:

- If you select a link on a web page that loads up an email package [e.g. to email the webmaster with comments], there is no way of closing this down via switch. Also, there is no way of closing down the popup selector via switch.

- With two switch scanning, you have one switch that scans and one that selects. However, you currently have to use your selecting switch to repeatedly select 'next link' to scan through a list of links. This was clearly very confusing for the User.

- It is not currently possible to have shift + key as switch input.

- Currently it is only possible to change the colour of the visual focus on the page. It is not possible to change the colour of the visual focus used to scan the buttons.

Facilitators' input:

- Trying to replicate a User's ¼ row, column scanning is difficult as it currently stands. This College has a standalone facility that can be turned off if end users have their own switch system.

- Perhaps there should be a different pattern of buttons for scan users.

Recommendations:

The ability to repair errors quickly with minimal effort is vital for switch users.

Keyboard access should be an important focus of attention so that switch users can use their standard access systems to access the browser. When people are accessing via an alternative such as SAW, there needs to be an option to hide most of the browser (perhaps just leaving the URL visible along the top).

The switch access to the browser should be easy to use both for those who have standard access systems so that they can use those with the browser, as well as for those switch users who do not have standard access systems.

Selection of some items should cause the scan to move directly to other items.

For the next and previous buttons, the option of making it possible to slow the auto scan down after a selection should be considered. This would mean that it would wait a little longer on the 'next' or 'prev' button than on other buttons to facilitate repeated pressing.

Another option to be considered in this context is to have the facility to choose 'next link' using the selecting switch, and then use the scanning switch to scan through the links directly on the page. Once you got to the link you wanted, you would select it with your selecting switch, i.e. the selecting switch performs the function of 'go link'. If you are a single switch user, you could select 'next link' with your switch. The links could then be auto scanned directly on page and the target link selected using your switch, i.e. again, the switch would be performing the function of 'go link'.

It should be possible to be able to change the colour of the visual focus used to scan the buttons. Also, it should be possible to change the colour of the visual focus for links, word/sentence/paragraph reading and frames independently of each other. For example, if the visual focus is red when using the 'next paragraph' button, and green when using the 'next link' button, it might help end users to understand the different functions of these buttons. Similarly, it is confusing to have a red border around the frame you are currently working in, and a red border around the text you are reading. Finally, it should be possible to make the border of the visual focus around the frame thicker than the current maximum of '5'.

3.3.8 Selecting links

User feedback on selecting links includes:

- When using a scanning interface, the end users found that choosing a particular link meant going through all links from the top of the page.

- When reading the text and reaching a link that the end users wished to go to, it was then necessary to use the Next Link button. However, Next Link brought the user back to the top of the page, and the end users found it very annoying to have to go through each of the links before being able to select the appropriate one.

Facilitators' input:

- If you are using your mouse as a navigation tool, you can't speak out the link by clicking on it – if you click on it, it goes to the link. There needs to be a distinction between reading and selecting links.

- In moving through a long list of links, there should be a facility to jump through a number of them at a time to speed up access.

Recommendation:

There should be a quicker way to jump through a number of links to the one you want.

It should be possible to use the Next Link button to take you to an embedded link whilst reading a paragraph (or sentence).

3.3.9 Entering URLs

User feedback on entering URLs includes:

- End users needed help to read and write an address to a new link.

- It might be useful to have support for entering website names, e.g., prediction, keywords etc.

Recommendation:

There needs to be a way of enabling end users to move beyond the range of sites in the favourites page. Perhaps consider ways of facilitating use of a search engine.

3.3.10 Output / Display

User feedback on output / display includes:

- Next Paragraph mode relies on new paragraphs in order to operate. Some pages are laid out in such a way that they use line breaks and spaces, leading to whole pages being read in paragraph mode. (Also see Speech Mode)

- Some end users needed to be reminded to select the Next Paragraph button and preferred to click on the paragraph itself to read.

- It was necessary to increase the size of the text for end users with a visual impairment.

Recommendation:

The beta version of the software needs an easy facility to change the size and colour of the text.

3.3.11 Scrolling

User feedback on scrolling includes:

- At first, end users did not notice there were more links further down the favourites page.

- One end user found it easier to use the scroll up/down buttons than using the scroll bar. Another end user was able to use the scroll bar to move through the page, but he suggested that someone with a tremor might have problems with this and would find the scroll up/down button very helpful.

3.3.12 Compatibility

Facilitators' input:

- Some sites have too many links, making it rather difficult or even impossible to work with (for example sites of popular football clubs; see addresses under technical problems).

3.3.13 Navigation

Feedback on navigation includes:

- After the end users had made a search on the Internet, it was difficult to find which link was relevant.

3.3.14 Settings

User feedback on settings includes:

- One user whilst scanning selected the Settings button by mistake. This could not then be closed by the user.

Facilitators' input:

- Using Settings, there is a risk of making changes not meant to be. It is not possible to have the text in the dialogue squares spoken with the synthesiser. (A user wanted to reduce the speed of the speech, which required a rather deep dive into the settings, which are not properly designed for end user access).

Recommendations:

It should be possible for the Settings facility to be easily greyed out or hidden from the user.

The comment about the use of settings implies a suggestion that settings – at least those that are available to and intended for the end user – should be supported by speech. The speech rate is definitely a setting that should be easily available to the end user. Another thing that came up during the session – currently not supported – was the need to easily change the speech support from one language to another – perhaps semi-automatic.

3.3.15 Training

User feedback on training:

- There is a need for context sensitive help; end users specifically asked for on-screen introduction to the functions of keys.

- After the morning familiarization session, one end user was very adept at using 2 chin switches to operate the browser. Another user, however, even with direct access, would have needed more practice in order to use the browser as independently and to remember which buttons to press for various tasks.

Facilitators' input:

This particular end user picked it up very well indeed, demonstrating more independence than when using a standard browser.

One user really needed more time to get used to it, and just when she started to get used to it, she was getting very tired and it was time to go home.

When accessing jokes on the web, one user was getting into a good routine with selecting next link and going to link buttons.

It was felt that there are many opportunities in the software, and the end user would need more training before he is able to use all of the features.

Recommendation:

We may want to consider putting together some form of mouse and switch accessible Internet (e.g. what is a link) and / or browser training package.

3.3.16 Effort

Facilitators' input:

- The end user thinks its worth the effort.

- A manual in Dutch would be helpful [i.e. should not rely on English support materials].

3.3.17 Comparison with Alternatives

Facilitators' input:

- Not aware of available alternatives – better than standard inaccessible browsers.
- Don't like screen readers, e.g. keyboard shortcuts, for our learners – far too complex for our learners.
- Doc Reader is an alternative, but one has to select the text to read out loud.

3.3.18 Using Frames

User feedback on using frames includes:

- Especially for switch users, it might be helpful to make it more obvious when someone is on a site where frames are available, e.g. have an option where it is announced that "frames available".
- It was surprising to see that when the user clicked on the frame to activate it, he actually clicked onto the link, which took him to the next link rather than to the new frame.

Facilitators' input:

- It was suggested that the Next Frame button and the Summary button should be with the 'within page' buttons (not at the top with the page navigation buttons).
- 'Next frame' a really good idea.
- Next frame worked well on our College's site.
- If sites have too many frames (for example look at the www.ajax.nl and in Technical Problems below), it is nearly impossible to read it with the buttons; as you get lost in the site. In that case, it is necessary to use the mouse, but then it is debateable what the utility of the browser is for that group.

Recommendation:

It was suggested that when going to a new frame, the Next Frame button needs to first select the frame, and the next selection would take the user to the link.

3.3.19 General

User feedback on more general issues includes:

- On the site www.itv.com, the browser immediately launched the music/video, without giving the user the choice.
- It was very difficult for two of the end users to get into a website that had a front page which required them to select a link called 'click to enter' to enter it. The page contained a range of other information and links which made it even more complicated.

Facilitators' input:

- Need to work on 'the rest of the world', i.e. web guidelines, accessibility.
- Definitely a market for this software.
- It was suggested that a finite number of links could be given as a guideline for web design.

Recommendation:

It needs to be discussed how to make the Stop button always active.

3.3.20 Technical problems

A series of specific technical problems occurred during the evaluations and these were reported to the technical partners (e.g. the appearance of a pop-up caused a problem with the speech synthesiser).

3.4 Summary and Conclusions

In comparison with the evaluations at the time of the simulator study, the key difference here was that the WWB was exploring 'live' online websites.

As with the Simulator study, users found the speech support particularly helpful. For this user group, flexible speech controls are clearly required, and many practical suggestions were made. Interestingly there were also a number of negative comments made by facilitators about using more traditional screen readers to facilitate Internet access e.g. the complexity of selecting text to be read aloud. This endorses the approach taken to speech support in the WWB, which does not require any highlighting, cutting or pasting of text.

The summary page was felt to be important for aiding navigation. How to meaningfully repurpose content for users on the summary page requires further investigation. Even with the support of the summary page, some users still experienced difficulties with long lists of links. Creative ideas are required to optimise navigation strategies for switch users in particular. Indeed feedback from sessions with switch users indicates that more work is required to improve the efficiency of switch access to the WWB more generally. Clearly extensive

customisation must be possible for switch users to get the most out of the WWB. However, it is also important to note that there are a wide range of options already, and that some of the difficulties may have been due to the fact that customising a piece of software to meet an individual's needs is normally accomplished over a number of sessions.

Facilitators emphasised the importance of being able to configure the software flexibly to meet the needs of individual users. For example, certain functions may want to be hidden for some users. A Layout Editor is clearly essential.

Like the users who took part in the simulator study, these users clearly valued the favourites page. The large graphics were appreciated. Suggestions for improvement included giving users more independent control over the content of this page. Support for entering URLs was requested, and this might be helpful to enable users to go beyond the set of favourite sites.

The icons on the browser were felt to be problematic. Recommendations for improvement were gathered, and these will need to be given serious consideration by the consortium. Some suggestions for additional functionality were also made e.g. an online thesaurus.

Training on the software is clearly an issue. For naive Internet users, there may also be a requirement for appropriate basic Internet awareness training.

There were a number of technical problems that will need to be addressed, but this was not unexpected given the alpha status of the software. Bad design of web pages was also sometimes to blame for these. For example, the 'next frame' feature struggled with sites containing large numbers of frames. One facilitator remarked that we need to work on the 'rest of the world'. This emphasises the importance of the work documented in Deliverable 12A.

The evaluation of the Alpha Browser with end users has led to specific recommendations, which should be implemented in the Beta version, if possible. In addition to these specific recommendations, the Facilitators have also made a number of comments and suggestions, which should be noted.

The recommendations have been broadly categorised under available functionality, with most specific recommendations for improvements covering:

- Improvements to speech output, for example in changing the speed rate
- Ease of adding favourites
- Clearer and more configurable icons on the buttons
- Clearer distinction between the functionality of different buttons
- Easier and quicker access for switch users, for example in selecting links

Whilst there are a significant number of suggestions for improvement raised, it should be stressed that, as in the earlier simulator studies, the overall feedback from both end users and facilitators has been very positive. The features already provided in the WWB have been very much appreciated, and even in its current form, it was considered a useful and valuable application, which has the potential to facilitate independent Internet usage for end users with complex communication needs.

4 ALPHA EMAIL EVALUATION

4.1 Introduction

The Alpha Version of WWAAC Email software (WEM) was not robust enough to be evaluated with external experts or users at the time of the alpha evaluation as technical problems meant that it would not actually send or receive emails, and it was crashing regularly. In addition, the alpha version of the WEM was based around Document Maker software, which was not felt to have an appropriate interface for target end users unfamiliar with this software. The alpha evaluation therefore consisted of an internal workshop with members of Workpackage 1 and Workpackage 4 in the UK, and some informal testing by these and other members of the consortium. The workshop involved setting up and then testing the WEM software before comparing it with Widgit's Inter Comm and Ablelink's Web Trek Connect. See Section 6.1.3 in Deliverable 13 for the workshop procedure.

Please note that this alpha evaluation does not represent a comprehensive evaluation of Widgit's Inter_Comm and AbleLink's Web Trek Connect. More detailed evaluation of Inter_Comm has already taken place – see Section 2.6 above.

4.2 Findings

4.2.1 Manual

Alpha WEM:

- The alpha manual for the email component provides clear information for use by evaluators and facilitators. In the longer term, more visual support e.g. screen dumps, and more assistance on how to go about certain tasks using the software, would be beneficial.

- Note that when 'help' is selected from the top toolbar, it currently links to the document maker manual, which has no reference to the email component.

Other Software:

- The Inter_Comm manual is extremely helpful. It contains many screen dumps.

- The Web Trek Connect manual is very brief, although there is an online help system.

4.2.2 Facilitator Configuration

Alpha WEM:

- The settings are quite comprehensive although we may want to extend the flexibility even further. There may be scope for making the menus more user friendly.

- Sometimes useful functions are under two levels e.g. altering menus & commands, and the use of both the Command bar and the Available Commands functions.

Other Software:

- Inter_Comm has a separate User Manager application for use by the facilitator to configure the application (see Figure 4.1).

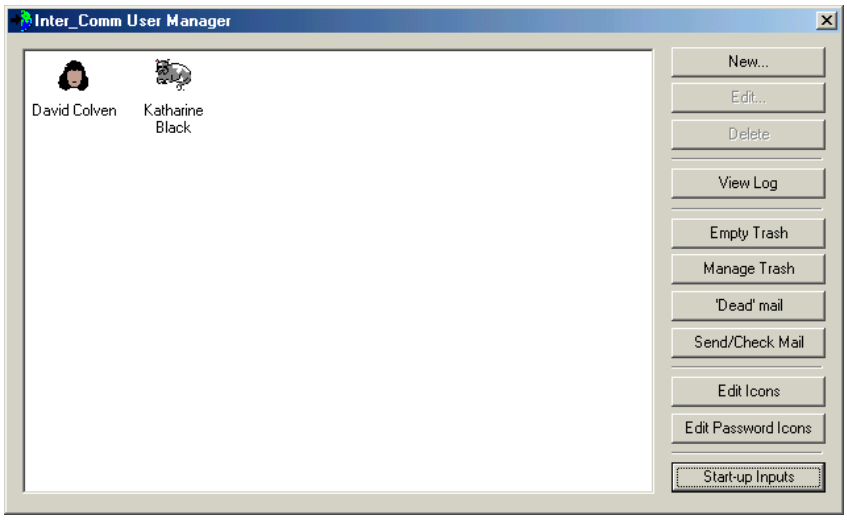

Figure 4.1 The main dialogue box for Inter_Comm's User Manager application.

- Inter-Comm's User Manager also provides some advanced options e.g. event logging (see Figure 2).

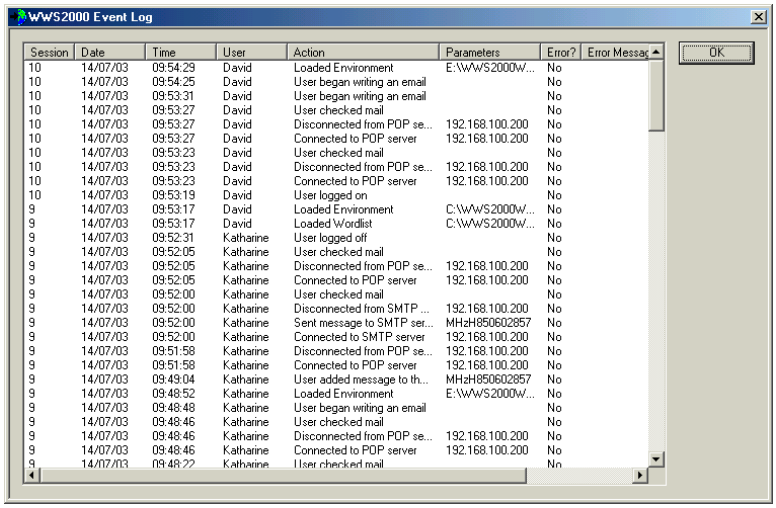
WWS2000 Event Log
OK
Session Date Time User Action Parameters Error? Error Messag
10 14/07/03 09:54:29 David Loaded Environment E:\WWS2000W... No
10 14/07/03 09:54:25 David User began writing an email No
10 14/07/03 09:53:31 David User began writing an email No
10 14/07/03 09:53:27 David User checked mail No
10 14/07/03 09:53:27 David Disconnected from POP se... 192.168.100.200 No
10 14/07/03 09:53:27 David Connected to POP server 192.168.100.200 No
10 14/07/03 09:53:23 David User checked mail No
10 14/07/03 09:53:23 David Disconnected from POP se... 192.168.100.200 No
10 14/07/03 09:53:23 David Connected to POP server 192.168.100.200 No
10 14/07/03 09:53:19 David User logged on No
9 14/07/03 09:53:17 David Loaded Environment C:\WWS2000W... No
9 14/07/03 09:53:17 David Loaded Wordlist C:\WWS2000W... No
9 14/07/03 09:52:31 Katharine User logged off No
9 14/07/03 09:52:05 Katharine User checked mail No
9 14/07/03 09:52:05 Katharine Disconnected from POP se... 192.168.100.200 No
9 14/07/03 09:52:05 Katharine Connected to POP server 192.168.100.200 No
9 14/07/03 09:52:00 Katharine User checked mail No
9 14/07/03 09:52:00 Katharine Disconnected from SMTP ... 192.168.100.200 No
9 14/07/03 09:52:00 Katharine Sent message to SMTP ser... MHzH850602857 No
9 14/07/03 09:52:00 Katharine Connected to SMTP server 192.168.100.200 No
9 14/07/03 09:51:58 Katharine Disconnected from POP se... 192.168.100.200 No
9 14/07/03 09:51:58 Katharine Connected to POP server 192.168.100.200 No
9 14/07/03 09:49:04 Katharine User added message to th... MHzH850602857 No
9 14/07/03 09:48:52 Katharine Loaded Environment E:\WWS2000W... No
9 14/07/03 09:48:48 Katharine User began writing an email No
9 14/07/03 09:48:46 Katharine User checked mail No
9 14/07/03 09:48:46 Katharine Disconnected from POP se... 192.168.100.200 No
9 14/07/03 09:48:46 Katharine Connected to POP server 192.168.100.200 No
9 14/07/03 09:48:22 Katharine User checked mail No

Figure 4.2. Inter Comm's User Manager Event Log.

- Web Trek Connect has simple, straightforward menus for basic facilitator configuration.

4.2.3 Icons

Alpha WEM:

- Much more work is needed on the standard email menu icons (see Figure 4.3). They are abstract, and sometimes difficult to differentiate. The icon for 'cancel', for example, looks like a 'tick'. It would also be helpful to be able to customise the icons, perhaps making use of icons from symbol sets familiar to individual users. A 'mix and match' facility between symbol sets would also be useful.

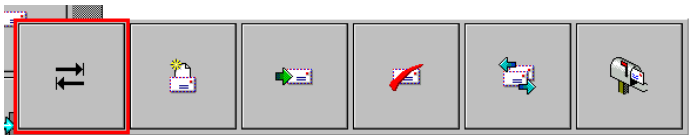

Figure 4.3. Document Maker Email Component's standard email menu icons.

- The 'Bliss-like' icon options could be helpful for some users (see Figure 4.4). Again, it would be of greater benefit if these could be customised.

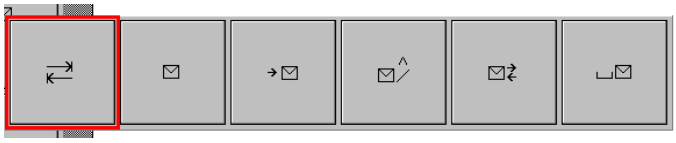

Figure 4.4. Document Maker Email Component's 'bliss-like' icons.

- The size of the icons needs work. Although it is possible to increase the size of the buttons, the icon size does not increase in proportion (see Figure 4.5). Much greater flexibility is required with icon and button size.

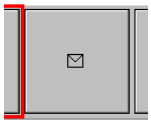

Figure 4.5. Document Maker Email Component's icons remain small despite increases in button size.

- At the present time, it is not possible to add text to the icons. This would be very useful. It would be necessary to be able to control the size of this text separately from the size of the icon.

- Menu icons relevant to email functions appear on a horizontal pop-up (see Figure 4.6). Even when the number of options down the left hand toolbar is reduced to those relevant to email, the majority of the icons remain on the horizontal pop-up menu (see Figure 4.7). This is an extra cognitive load, and an extra switch/mouse press selection. A default setting whereby all icons relevant to email are visible is essential.

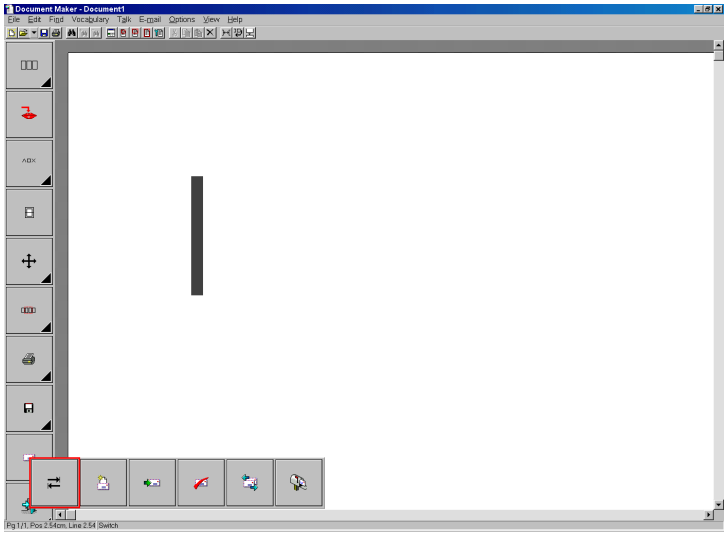

Figure 4.6. Document Maker Email Component's menu icons appear on a horizontal pop-up.

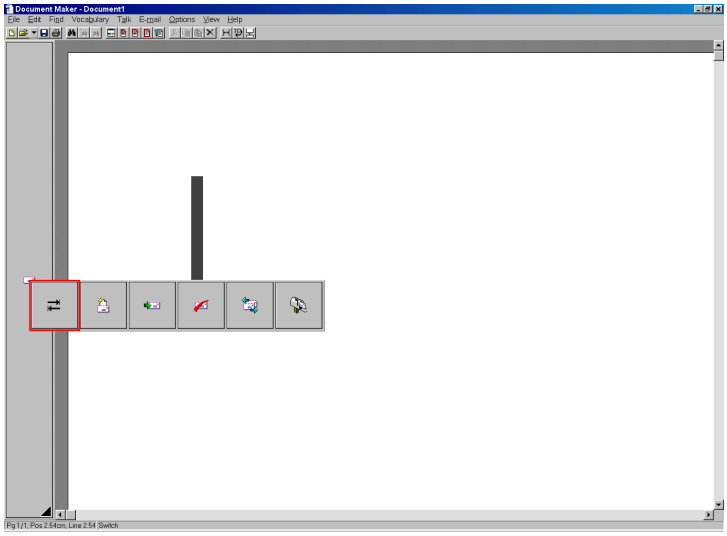

Figure 4.7. Document Maker Email Component's menu icons remain on a horizontal pop-up despite there being only one icon on the vertical toolbar.

Other Software:

- Inter_Comm supplies a number of default sets of icons that can then be edited and customised at will, e.g Rebus, PCS (see Figure 4.8). It is a very good example of what we would be looking for in a revamped WWAAC E-mail module. We would not recommend the use of scroll bars to deal with a larger number of icons as seen in Inter_Comm (see Figure 4.9).

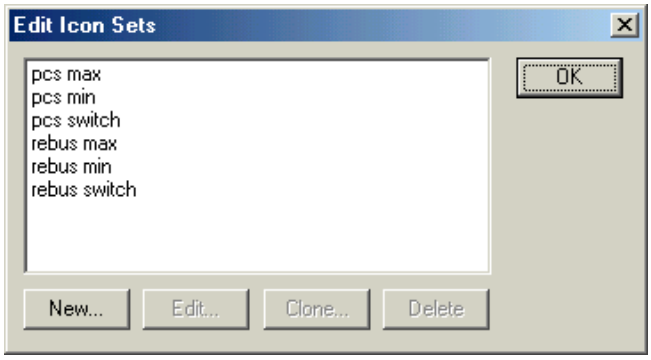

Figure 4.8. Inter_Comm's default icon sets. These can be edited via this dialogue box within the User Manager application.

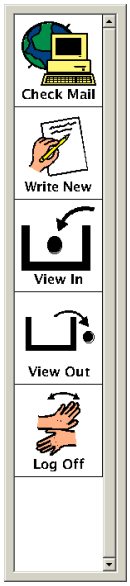

Figure 4.9. Inter_Comm's default PCS Max main toolbar.

- Web Trek Connect has user-friendly menus for facilitators to decide what icons should or should not appear on-screen. The facilitator sees all the icons available, and simply clicks in a tick box to indicate what icons would be useful (see Figure 4.10). This might enable joint planning of the onscreen area.

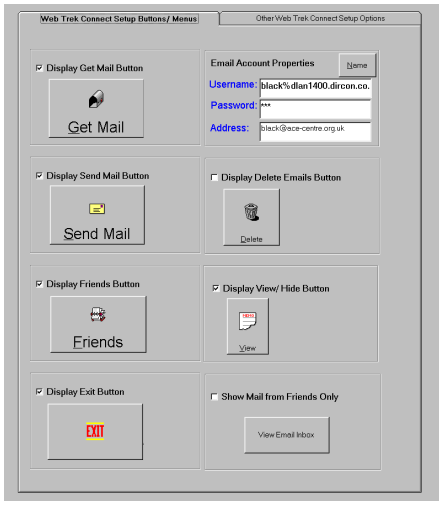

Figure 4.10. Web Trek Connect's Setup Menu.

- Web Trek Connect uses an alternative, larger hour glass icon to give clear visual feedback to the user.

- Web Trek Connect gives some of its icons 'friendly' labels, e.g. 'oops' for cancel, 'friends' for address book etc. (see Figure 4.11).

Figure 4.11. Web Trek Connect's 'Cancel' button.

4.2.4 Auditory Support

Alpha WEM:

- Speech support should be available for buttons, menus, the address book, inbox, outbox etc..

- We may want to consider using digitised rather than synthetic speech for some support.

- We may want to consider having digitised 'prompts' that can be turned on or off – a bit like the optional paperclip in word.

- A screen reader might be useful for attachments.

Other Software:

- Web Trek Connect provides digitised prompts. However, it would be preferable if these were accompanied by a dialogue box which contained the text of the prompt, and 'stop' and 'repeat' buttons.

4.2.5 Address Book

Alpha WEM:

- The current address book is very confusing (see Figure 4.12).

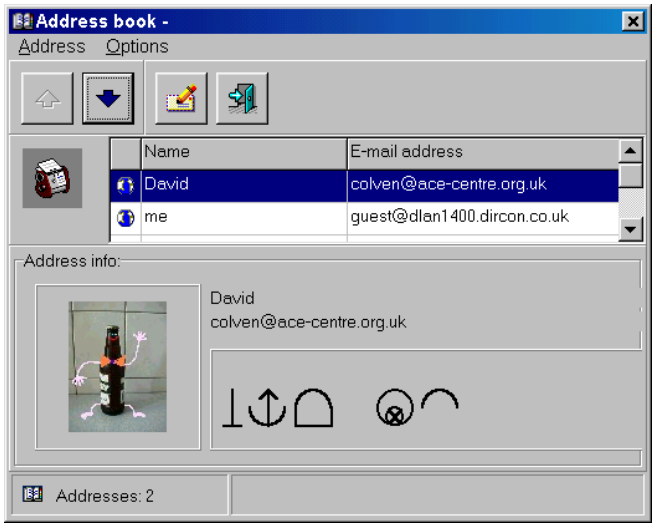

Figure 4.12. Document Maker Email Component's Address book.

- The use of a highlight on a list of email addresses with the more detailed information being displayed below is quite abstract and confusing. It also results in a duplication of much information on the screen.
- There should be a photo or a symbol to represent a person, but probably not both (or at least not as a default setting).
- It should be possible to customise the size of the photo or symbol and the size of the text presented to the user.
- The calendar / rolodex icon on the left is redundant, and only provides additional visual clutter.
- Displaying email addresses should be optional, as many users would not be able to make use of this information, and again, it only provides redundant visual clutter.
- There should not be any scroll bars. If the number of addresses exceeds the available space, 'page up' / 'page down' and 'more' buttons should be employed.
- The address book should really be a full page rather than a dialogue box.
- We strongly recommend that the address book have a similar appearance to the favourites page in the WWAAC browser.

Other Software:

- Both Inter_Comm and Web Trek Connect provide a simple address book for the user whereby a person only needs to select a photo / picture / symbol and / or a name (see Figure 4.13). The email address does not appear underneath these photos.

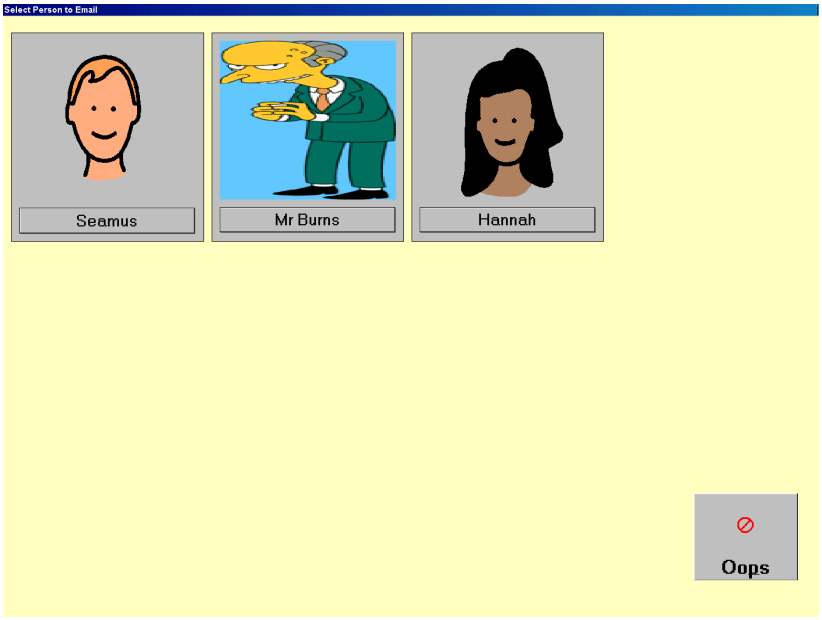

Figure 4.13. Web Trek Connect's simplified Address book.

- Within Web Trek Connect's more complex address book (used when adding and editing entries), there is a bar down the left hand side that looks like a scroll bar, but in fact performs the function of 'page up' / 'page down' and 'next' / 'previous' (see Figure 4.14).

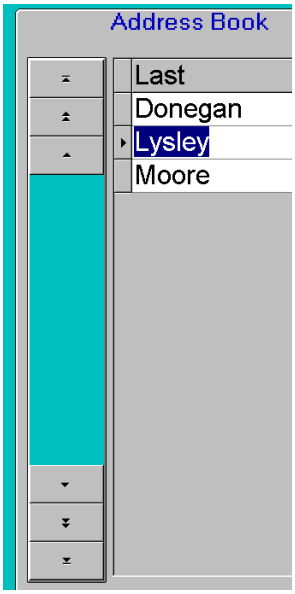

Figure 4.14. Web Trek Connect's more complex address book.

4.2.6 Mail Boxes

Alpha WEM:

- Many of the comments made relating to the address book also apply here. It is currently much too confusing.

- An option to automatically and / or easily add incoming mail details to the address book might be useful. This might resemble the capturing of websites for the favourites page facility on the browser.

Other Software:

- Both Inter_Comm and Web Trek Connect provide simplified mail boxes for easy user access (see Figure 4.15).

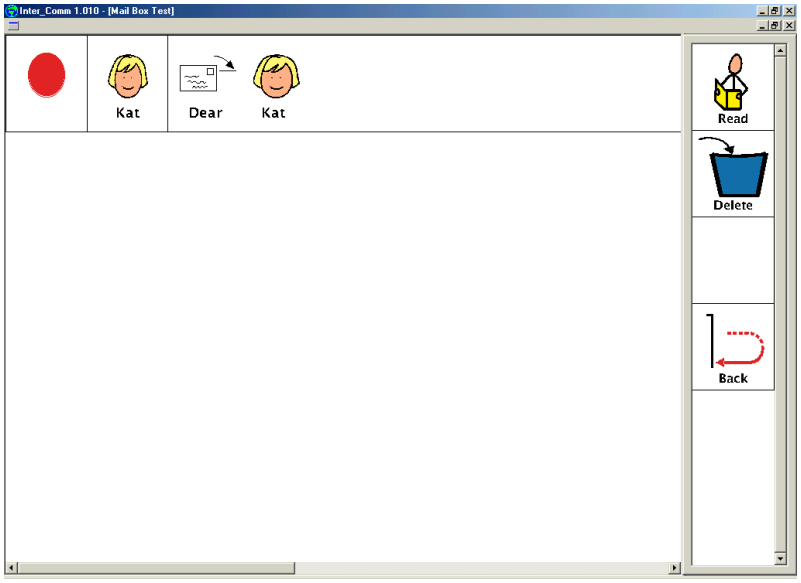

Figure 4.15. Inter_Comm's outbox.

4.2.7 Composing an Email

Alpha WEM:

- Currently it is difficult to input into an email using the keyboard. It is either necessary to select an option from the toolbar relating to text only, or the user has to deal with a complex dialogue box to select a symbol. In any case we strongly advise that the E-mail component has a cut-down and simplified text/symbol editor independent of Document Maker's elaborate interface.

- We may also want to consider having an audio facility for recording an email and then attaching it.

Other Software:

- To compose an email in Web Trek Connect, it is anticipated that the user will record a .wav file which is automatically attached to an email (see Figure 4.16). Otherwise, emails can be constructed using the keyboard in the standard way with no additional support.

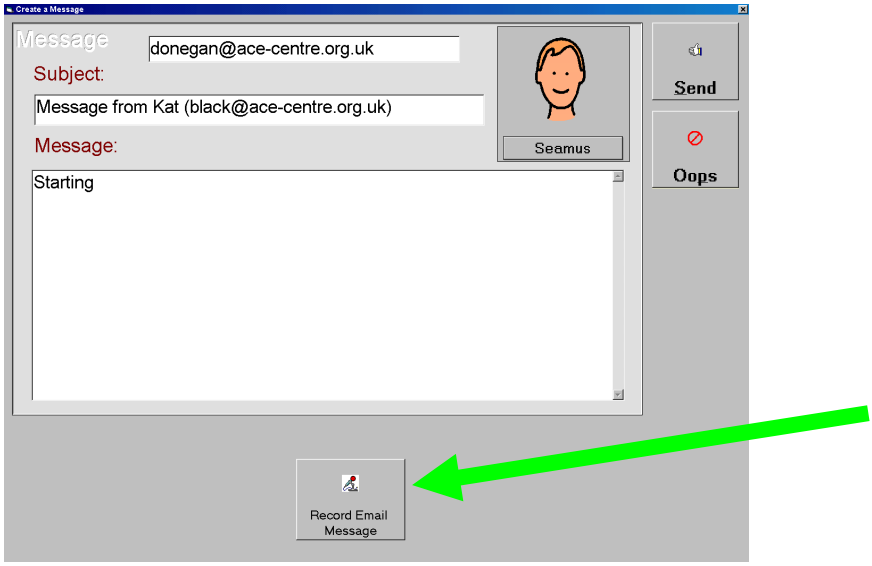

Figure 4.16. Composing an Email in Web Trek Connect.

- With Inter_Comm, an email can be composed by selecting cells from pre-programmed environments, or by inputting directly using the keyboard. When inputting via the keyboard, there is an option whereby symbols appear as words are typed. F12 can be used to scroll between different symbol possibilities (this is a standard Writing with Symbols function). No special setting has to be used to move between these two modes of input.

4.2.8 Subject Line

Alpha WEM:

- There is usually an expectation that emails should/will have subject lines. However, we do not feel that users should have to input information into the subject line (although this could be an optional setting). Two optional 'default' settings are proposed:
    - The subject line automatically contains the first line of the email constructed.
    - The subject line is always "a message from xxx [this would be automatically taken from the user name in settings]" with the facilitator being able to program an alternative standard subject line.

Other Software:

- Inter_Comm automatically takes the first line of the email composed. Figure 4.17 shows how 'Dear Kat', which was the first line of this email, has automatically become the subject line.

Figure 4.17. The subject line in Inter_Comm.

- Web Trek Connect automatically puts “message from username” into the subject line (see Figure 4.18).

Figure 4.18. The automatic subject line in Web Trek Connect.

4.2.9 Sending an Email

Alpha WEM:

- Once ‘send’ is selected, the email ‘vanishes’ and you are left with a blank document. A user will need some additional feedback, e.g. a graphic showing that the email is being sent.

- At the current time, there is no message indicating whether or not the email has actually gone.

- The terminology of ‘exchange’ is very confusing. It should be separated out into two functions: ‘send’ & ‘receive’. Double toggled functionality can be very confusing for users.

- If you select ‘address first’ in options, ‘new’ and ‘send’ perform identical functions. If you select ‘write message first’ in options, ‘new’ and ‘send’ perform different functions. This is confusing.

- The wording of ‘send’ in the above context could be confusing. ‘Send’ seems to imply something you do to a finished email. ‘Write email’, for example, might be preferable.

- Once you have selected to write an email, a yellow banner appears along the top giving email address and subject (see Figure 4.19). These contents should be replaced with a photograph and/or the name of the person to whom the email is being written. There is unlikely to be any need to display the subject within this banner.

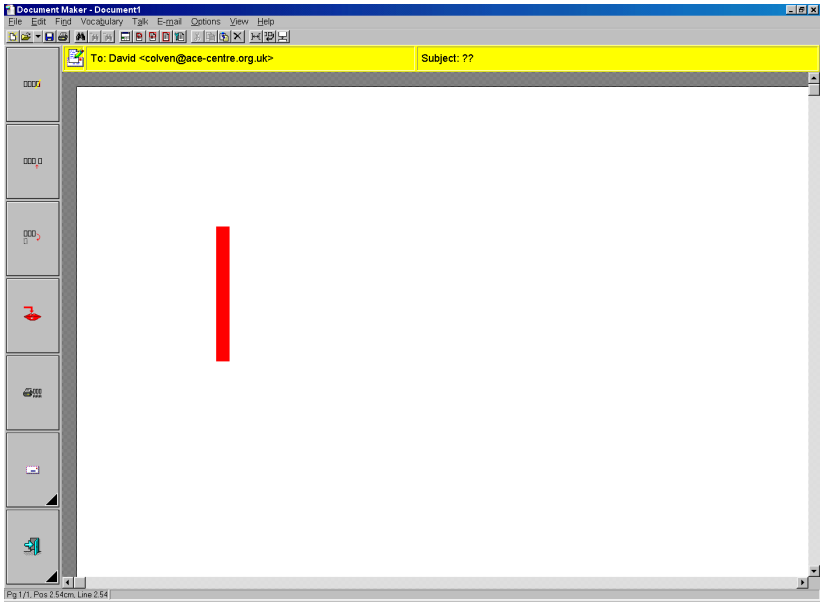

Figure 4.19. Document Maker Email Component's yellow banner which appears when composing an email to a person chosen from the address book.

Other Software:

- With both Inter_Comm and Web Trek Connect, the user selects 'send mail' or 'write mail', and then chooses a person from a pictorial address book before composing / recording the email.

- In Web Trek Connect, the user sees a picture / photograph of the person and their email address as they are recording a message to them (see Figure 4.20). Note that the email address is unlikely to be meaningful for many users.

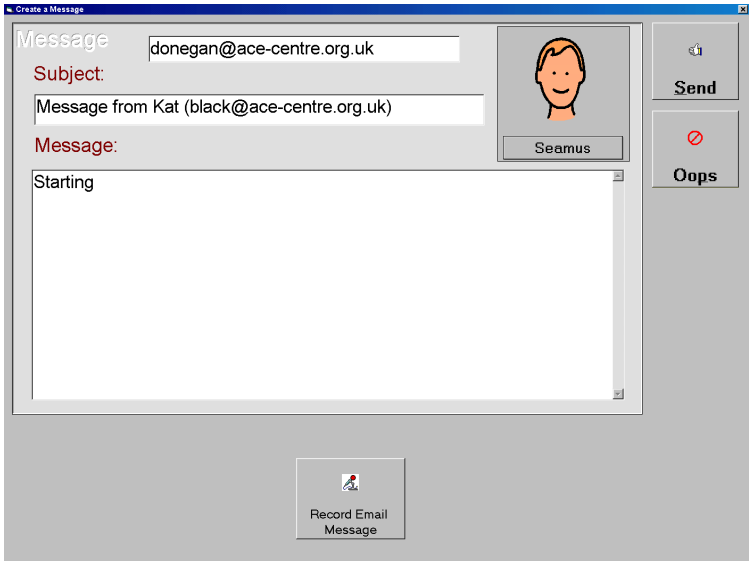

Figure 4.20. Composing an Email to 'Seamus' in Web Trek Connect.

- In Inter_Comm, the user is given no visual feedback as to the chosen recipient whilst composing their email (see Figure 4.21). The standard email grid however, is configured to automatically insert a picture of the recipient upon selection of 'dear'.

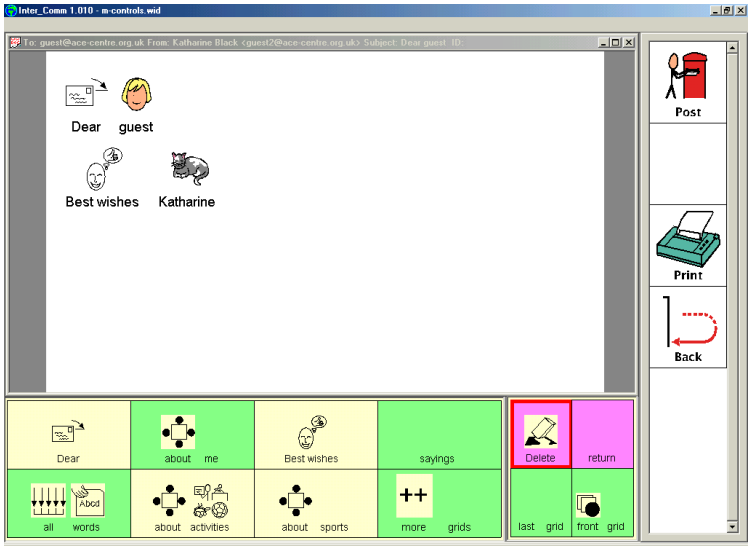

Figure 4.21. Composing an Email to 'guest' in Inter_Comm.

4.2.10 Reading Emails

Alpha WEM:

- There should be a "screen reader" for reading incoming emails. It would be consistent if the controls were those used in the WWAAC browser.

- It is not possible to move between emails without going via the Inbox. 'Read next message' and 'read previous message' buttons might be useful.

Other Software:

- If Web Trek Connect software detects the presence of a .wav file, it will automatically open this and play it. If no such file is present, it will read out the contents of the email using text-to-speech.

- Inter_Comm can speak out an incoming email sentence-by-sentence.

4.2.11 Attachments

Alpha WEM:

- This is an area to be developed. Consideration needs to be given as to how the software will deal with any incoming attachments.

- It might be helpful if a screen reader could be activated to read aloud any document attachments. We should be moving towards an 'integrated system', so this screen reader could look and feel like the reader in the browser.

- Users may want to include an attachment with an email. As a minimum, it should be easy for a user to include a photograph or sound file as an attachment.

Other Software:

- Web Trek Connect will automatically open and play an attachment if it is a .wav file.

4.2.12 Spam Filters

Alpha WEM:

- We may want to consider embedding some filters into the software.
- We may want to have a setting whereby the facilitator can select an option only to receive emails from people already in the address book.

Other Software:

- Web Trek Connect has a facility whereby you can limit email appearing in the inbox to only those sent by people listed in the user's address book.

4.2.13 Password Protection

Alpha WEM:

- We may want to consider having some form of password feature.

Other Software:

- Web Trek Connect provides a small dialogue box for typing in a password in the standard way. No support is given to users.
- Inter_Comm has a facility whereby a password can be set by making three selections from 9 icons / symbols / numerals (see Figure 4.22). This can be customised so that the pictures are most relevant / memorable to the user. It does not appear to be possible for the user to set less than three icons as a password, and there is no facility for having a sequence of identical icons for someone who would find it difficult to remember a sequence of three different items.

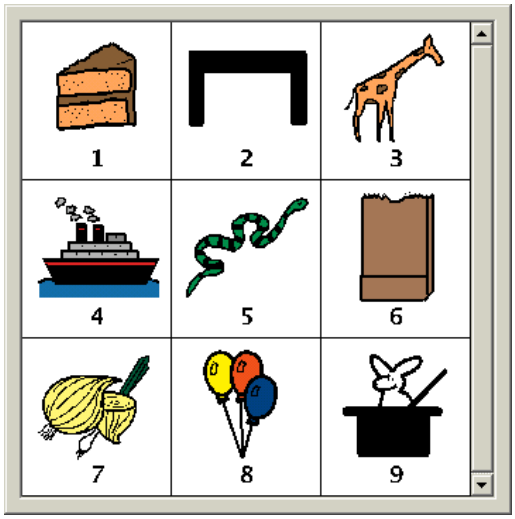

Figure 4.22. An example of Inter_Comm's password input screen.

4.2.14 Multi-User Capability

Alpha WEM:

- The email (and browser) software should have multi-user capability by the time it enters its post-WWAAC commercial phase.

Other Software:

- Inter_Comm has multi-user capability. The user selects a photograph or symbol of themselves upon loading the software (See Figure 4.23).

Figure 4.23. Inter_Comm's multi-user dialogue box – here set up to allow two users access to the software.

- Web Trek Connect has multi-user capability when used in conjunction with the Voyager Desktop application.

4.3 Summary and Conclusions

This workshop compared features of the Alpha Version of the WEM with Widgit's Inter_Comm and Ablelink's Web Trek Connect. The comments, suggestions and recommendations made about the Alpha version of WEM above were fed back to

the technical partners. These included comments, suggestions and recommendations on:

- The Manual
- Facilitator configuration
- Icons
- Auditory support
- Mail boxes
- Composing an email
- The subject line
- Sending an email
- Reading emails
- Attachments
- Spam filters
- Password protection
- Multi-user capability

The key recommendation was that the user interface of the WEM be changed so that it shares more common features with the WWB. The necessity for more stable and reliable software to enable evaluations with end users was also stressed.

5 WWAAC WRITING SUPPORT – PILOT INVESTIGATIONS

5.1 Introduction

This Section describes the first trials with the WWAAC Writing Support (WSW). More information can be found about the research underlying the WSW in Deliverable 8 – Linguistic Support Modules.

The pilot evaluation was conducted on two occasions during October 2003 with two end users in Sweden who predominantly make use of Bliss for their written communication. The methodology for the pilot evaluation can be found in Section 7 of Deliverable 13. More informal pilot trials were also conducted in the Netherlands. These results are reported in Section 5.4.

The intention of the pilot evaluation of the WSW in email composition was to receive the end users' feedback on an integrated first version of the WWAAC Email (WEM) with the WSW. Since this was not available, the WSW had to be presented to the writers as a stand-alone writing support module.

The rationale was presented to the users, and they were then asked to follow a script, trying to find the appropriate structures and correct symbols. They were then asked to give a conjecture as to whether the WSW would be helpful in any way.

5.2 Pilot Trials in Sweden

5.2.1 The Status of the WSW

Since the version utilised in the trials in Sweden was the first version produced, there were several functions of the software that were not working. The missing functions were:

- No "undo" button, which means it is not possible to browse through the symbol charts to find the target symbol
- No backspace function, which means it is necessary to restart the whole sentence upon entering an undesired symbol
- No access to personal symbol set, which means it is only possible to follow a script rather than free writing
- Syntactical inconsistencies, such as auxiliaries not linking to the verb page
- No sentences types in the negative
- Number codes instead of concept glosses appearing on the text line, which means there is no auditory nor visual feedback on what is being entered
- There is no speech after finishing a sentence.

The software was also unstable.

5.2.2 Users – Swedish Workshops

User 1 is a male of 38 years, with cerebral palsy. He does not walk and has severe dysarthria. He is understood by his personal assistants and other familiar persons. He has a Bliss board, but communicates most often orally. He is at a pre-literate stage. He is interested in participating in discussions about metalinguistics, such as differences between spoken language and "Bliss language", and colour coding on the Bliss board. He has normal vision and hearing.

User 2 is a male of 19 years of age, with cerebral palsy. He walks, but has severe dysarthria. He cannot make himself understood by unfamiliar persons using speech but communicates with his Bliss board. He is a very experienced Bliss user. He is at an emerging literacy stage. He can do some spelling on his Bliss board and sometimes read glosses above the symbols. He has knowledge about letters. He has normal vision and hearing.

More detailed information on these users can be found in Appendix 6.

5.2.3 Procedure

As outlined in Section 7.2.4 of Deliverable 13, an *ad hoc* set of six judgment tasks to distinguish grammatical form from content was undertaken (see Appendix 5B in Deliverable 13), and the T.R.O.G. (Test for the Reception Of Grammar) was administered (see Appendix 5C in Deliverable 13). Users' responses to the ad hoc judgement task are detailed in Appendix 7.

After carrying out these initial investigations, users were presented with two scripts (see Section 7.4 of Deliverable 13). Before starting the task with the second script, a small vocabulary check was conducted to see whether the users could find the particular symbols that appeared in the script.

The linguistic pilot was carried out over two sessions. At the first session, the linguistic investigations took place and the first script was administered. At the second session, the vocabulary check and the second script was administered.

5.2.4 Findings – User 1

5.2.4.1 Ad Hoc Task

At the first presentation, User 1 tended to make semantic choices e.g. matching "bird" with "fly". After some reasoning he was able to distinguish form from content and demonstrated understanding of the idea. Before he understood the aims of the task, he had thought it was "cheating" to use the grammatical markers above the symbols. He could make use of the colour coding and markers to categorise the words, and could also assign new words that are not on the chart to the correct grammatical category by thinking of their colour category.

User 1 made some interesting reflections during the discussion regarding content vs. form. "After a while I realised what you were aiming at. When I speak it comes out in Bliss but inside my head I get it all right. I am not good at placing the words in the

right order. I go for the essence first and then I construct the message around that. I am not used to using small (function) words. I am not used to constructing written messages. It would be good to be able to produce proper sentences in order to be understood."

5.2.4.2 Test of the Reception of Grammar (T.R.O.G.)

User 1's performance on T.R.O.G. showed good basic grammatical understanding but not reaching 'adult' level. He succeeded on 14 blocks, with another four blocks with one incorrect answer. On two blocks he had more than one incorrect answer (relative clauses three incorrect answers and embedded clauses two), which should be interpreted as if he does not have a good command of the specific structure.

5.2.4.3 Script 1

User 1 was able to follow the script with assistance and find the target structures. Since his reading abilities did not allow him to read fields with only text instead of symbols, or read the gloss above unfamiliar symbols, he appreciated the fact that the program read out loud when the arrow was placed over a field, and that the program spoke when navigating with the marker.

User 1's first impression was that this support could help him in the future and be a training tool for learning "how to think in spoken language instead of Bliss language". He reported that he "thinks in Bliss" (has been doing that for 30 years) and believes this would be a good way to start to think in "normal language". Intuitively he thought this would be a good piece of support and a good training tool.

During this phase it was too difficult to work independently and the program was not sufficiently intuitive.

5.2.4.4 Vocabulary Check for Script 2

This user had difficulties finding the particular target symbols, but was usually able to solve the task with some assistance. One explanation could be that User 1 communicates mainly with speech, interpreted by his personal assistants when necessary and uses his Bliss chart only when prompted. Table 5.1 illustrates the results of the vocabulary check:

Target symbol	**Number of key pressures**
I	3 (minimum number of key presses necessary)
She	various trials, correct after explanation
Friend	various trials, correct after explanation
Tonight	difficult
Last summer	difficult to distinguish from "next summer"
Have to	instruction: "together with 'will'"
Get	first trial
Go	first trial
Cinema	difficult, different symbol on chart

Table 5.1. The result from the vocabulary check, User 1

5.2.4.5 Script 2

After the vocabulary check, User 1 then worked on the script. He initially selected 'restart' after typing 'Yesterday I'. He was then able to follow the script, but required with assistance.

User 1 was able to understand the basic rationale behind the software, although he found it very complicated to use. There was also some confusion due to the missing functionality of the rules and thus the sentences came out as ungrammatical. This user found it very difficult to keep in mind the sentence he was to write, and to "stay on track". It was easier to remember where the particular symbols were located on the screen than to remember the syntactic type chosen. He asked for repetition of the target sentence many times.

5.2.5 Findings – User 2

5.2.5.1 Ad Hoc Judgement Task

User 2 was not sure about matching word and sentences regarding the form (grammatical) aspect, and could not always distinguish form from content. Only after some reasoning did he get some matching pairs correct.

User 2 was quite convinced when he gave incorrect answers, e.g., matching "bird" with "fly". When he was asked to think about the colour coding on his Bliss chart, he was able to correctly categorise the words that were on the chart but not the words that he knew but were not on the chart. This indicates that he was not sure about the content-form principle and could find the right answer not by grammatical awareness, but by remembering the colour codes.

5.2.5.2 T.R.O.G.

User 2's performance on T.R.O.G. showed good basic grammatical understanding but not reaching 'adult' level. He succeeded on 17 blocks, with another two blocks with one item incorrect, and failed on one block (embedded clauses).

5.2.5.3 Script 1

User 2 understood the idea of the software and managed to follow the script and localise the target symbols with assistance. He thought it was very useful to see the log fields, i.e., a line with all earlier keyboard events registered, but he did not like the idea of having automatic punctuation marks. However, the sentences may otherwise be so long, and the number of choices so many, that they become difficult to handle.

5.2.5.4 Vocabulary Check for Script 2

User 2 was able to find most target symbols with the minimum number of key presses. One explanation could be that B is a very advanced Bliss user and uses his chart for most conversations. Table 5.2 illustrates the results of the vocabulary check:

Target symbol	Number of key pressures
I	3 (minimum)
She	3 (minimum)
Friend	after ”I”, ”you” and explanation
Tonight	2 (minimum)
Last summer	2 (minimum)
Have to	3 after explanation
Get	
Go	
Cinema	

Table 9.2. The result from the vocabulary check, User 2

5.2.5.5 Script 2

After the vocabulary check, User 2 then worked on the script. He could easily use the preset phrases and he thought they could be very useful. He had some difficulties in following the script and was too quick to select the symbols, thus he was able to follow the structures but with the incorrect semantic content. The sentence “Tonight I’m going to the cinema.” was realized as “Tonight woman will write to Peter.” However, he was able to discover some structural similarities between the two sentences.

5.3 Additional findings from pilot trials in the Netherlands

The pilot trials conducted in the Netherlands were of a more informal nature than those conducted in Sweden.

Two Bliss users participated in the trials. They were not able to use their personal bliss charts with the WSW at the trial, but this would be possible in the future.

These particular users lacked knowledge about some grammatical structures and therefore were not able to make use of all of the structures in the WSW. Examples of grammatical difficulties included starting a question with a verb and making use of auxiliaries. It is unclear from the report whether they were able to recognise the sentence types by listening to them with the speech synthesis. They found starting a sentence with “I” fairly easy.

Some suggestions for improvement were made, e.g., add a word prediction function. The users also commented on the fact that they both think it is important to continue using Bliss symbols, so as not to forget them (one user is forced in school to use text instead). They both questioned the importance of making grammatically correct sentences, so long as others understand what they want to say. However, it may be helpful to clarify that the idea is symbol-to-text conversion for e-mail and other

electronically transferred messages. The evaluator's opinion was that WSW would be important to produce well-formed sentences when mailing with these users.

5.4 Summary and Conclusions

Two workshops with the purpose of alpha testing of the WSW (WWAAC Writing Support) were performed during two days with User 1 & User 2. The workshops included one small test to examine the ability to distinguish grammatical form from content and the administration of T.R.O.G. (Test for reception of grammar).

During the workshops, the very first version of the WSW was tested. The general idea of the software was explained, i.e., the software will assist in making grammatically correct sentences that can be automatically translated into text and is to be used in an integrated e-mail software. Buttons for word class selection and speech output were demonstrated. Since there was no access to the users' own symbol sets, there was no task including free writing. The tasks consisted of a) finding specific words that were embedded in the structures, b) follow a simple script, and c) include pre-made phrases typical for e-mail dialogue.

Both users, especially User 2, understood the idea of the program and thought it could be a useful support for text composition. Both users said they were willing to continue testing the next version in the study that will start in January 2004.

The purpose of running a pilot evaluation is to present the ideas in order to get feedback for further development. At the time of the pilot evaluation, there was a draft WSW version to demonstrate. However, too much of the functionality was missing and too many errors occurred during the trials with a very unstable version, to give the users a fair chance of seeing potential benefits of the software. The users were frustrated because of what they could not do and were confused by too many events on the screen, not controlled by themselves. However, despite this, they were able to recognise positive effects of the WSW when the idea was explained.

The key issues fed back to the technical partners were:

- this version of the WSW is too complex and unstable
- key features and functionality are missing (see Section 5.2.1)
- more training must be given to users on the WSW
- the WSW interface has to be more intuitive.

6 EVALUATION OF BROWSER & EMAIL BETA VERSION

6.1 Introduction

This Section summarises the results of the Beta evaluation phase in which the WWAAC browser and email software were evaluated in a series of end user trials. It also provides an update to some of the work done in D2 User Requirements Capture looking at developments in web accessibility (Section 4) and developments in Email accessibility (Section 5).

The detailed methodology can be found in Section 8 of Deliverable 13. The Beta evaluation methods and tools were refined to reflect the lessons learnt through the Alpha trials, especially with regard to the workshop procedure and the tools used to identify and record information from the end users.

The primary target population of end users defined by the project at this stage were people between the ages of 12 and 25 years who use graphic symbol-based AAC in face-to-face interaction, and who are supported in their use of the Internet. Given the considerable variation in abilities of our primary target users, in addition to variation in an individual's performance over time, it has been important to accept that a certain degree of flexibility was needed in how the techniques are applied in each particular case.

Technical problems were reported to the developers immediately after the trials so that any faults could be resolved as soon as possible therefore the technical problems will not be reported or discussed in this Section.

The workshops included an initial task called 'fostering openness'. This was designed to encourage users to feel comfortable in making negative responses as well as positive responses. From a validity point of view, it is therefore encouraging to note that 8 browser (47%) users and 4 email users (33%) made use of one or more of the negative options during the interview.

It is important that certain issues are considered when analysing some of the responses from the users or facilitators during the Beta trials. For example, one user's attitude towards the browser software was very negative in the morning session, but during discussions with the facilitators, it was discovered that not only was he quite tired that day, but that he was also missing an introduction to a new communication aid by taking part in the evaluation. However, he returned enthusiastically to the afternoon session having discovered that his aid was not yet ready after all, and his responses were much more positive. The evaluators have, therefore, provided any additional information or explanation if this is available, either from their own observations or from discussions with the user and/or facilitator.

This Section consists of 4 sub-Sections:

- Beta browser trials
- Beta email trials
- Facilitators' Input

- Update on Web and Email Accessibility

The appendices contain:

- Appendix 8 – the integrated results of the user interviews for the WWAAC browser.
- Appendix 9 – the integrated results of the interviews with end users for WWAAC email.
- Appendix 10 – Integration of end user's profiles

6.2 Users

Table 6.1 below summarises the number of end users involved in the trials for both the WWB and the WEM software:

Country	Browser	Email
Holland	3	1
Sweden	4	4
Denmark	3	3
UK	4	1
Finland	3	3
Total	17	12

Table 6.1. End Users in the Beta WWB and WEM Evaluations

The beta evaluation phase involved 18 individual AAC users: 11 users participated in both WWB and WEM trials, 6 users participated in the WWB trials only and 1 user participated in the WEM trial only. The age of the users ranged from 14 to 49 years old and the mean age was 35 years old. In total there were 13 male and 5 female end users involved in the trials. 13 out of 17 users (72.2%) had had some experience of the Internet either at school, home or work but only 3 users (17%) achieved access independently. The majority of users achieved access with support (83%).

6.3 Beta Browser

6.3.1 Findings

6.3.1.1 Speech Mode

In total all the users (n=17) used the speech output during their trial. The majority of users (88%) gave a positive response when asked about the speech support provided by the WWAAC browser. 11 users (65%) thought that the speech support was very good, 4 users (23%) thought it was good, 1 user (6%) had a neutral response and 1 user (6%) thought that the speech support was bad. Results for some of the other functions related to speech are given below:

- Eight users commented on the outline of the text. 7 of these users thought that the outline was very good and 1 user wanted the outline around the text to be thinner.

- Ten users commented on the next/previous buttons within the browser and all thought that the buttons were useful when browsing the Internet.

- In the trial with seven of the users, a change was made in how much the browser read out in one go (word, sentence, paragraph, whole page). All the users had a positive experience with this function and found that it was useful.

- Five users had experience of altering the speed of the speech synthesizer. All the users found the function useful, 1 user suggested that they would need some form of feedback to demonstrate the newly selected speed.

- Three users used the browser to alter the volume of the speech synthesiser. All of these users thought that this function was useful.

Other comments/suggestions about speech support:

- For one of the users, access to a female synthesised voice was very important.

- The quality of the speech synthesiser needs to be improved and users should ideally be able to use any 'voice' they like or are used to. (This is not within the current scope of the project as the WWAAC browser is compatible with any SAPI compliant synthesiser).

- The ability of being able to alter between word/sentence/paragraph is a good function as, if something requires more concentration, then the user can listen to the content in smaller chunks.

- One of the users found it beneficial that different colours were used on the layout they were working with for altering speed/volume.

- It may be better if automatic scrolling started a bit sooner so that the user could always see the next sentence or paragraph.

- It would be useful if the user could hear a test sentence every time the 'alter speed' button was pressed. Also there was no indication of the current speed or volume (i.e. no scale to inform the user).

- On occasions the speech synthesizer read out drop down menus which the users found confusing (e.g. www.bbc.co.uk).

- It would be better if the scanning options were more flexible and could be configured to work in the same way as the user's AAC device (e.g. Assistant).

6.3.1.2 Using links

In total 15 users used the links function within the WWB. The majority of users (80%) had a positive experience with exploring the links using the browser's buttons. 9 users (60%) thought that the browser button's for exploring the links were very good, 3 users (20%) thought that they were good, 2 users (13%) had a neutral response and 1 user (7%) thought that they were very bad. Users' responses for some of the other functions relating to links are given below:

- Eight users used the 'skip 5 links' button during their trial. 7 of the users thought that the function was very good and helped them save time. 1 of the users was confused at first as the function didn't always work as expected, but this may be due to the web page.

- Four users commented on the sound the software made when it came across a link. 2 of the users found the sound useful and 2 of the users did not like the sound made by the browser.

- Five users were able to comment on their experience of going to a link using the software, and all the users had a positive experience.

Other comments/suggestions about using links:

- The images of the websites make it easier for users to recognise the websites as well as a larger area that can be selected to activate the web page.

- The users need to be comfortable with the concept of 'links' on the Internet to be able to use to software more effectively.

- The sound the software made when coming across a link was liked by some and not liked by other users. It should also be noted that there was a bug in the browser at this time that meant the word 'link' was spoken at the same time as the link itself being read out. This may have affected peoples' attitude towards this facility. The flexibility to choose different sounds (e.g. voice saying 'link' or windows default sound) allows the software settings to be tailored to the particular preferences and needs of each individual.

- The concept of a graphical link was difficult for one of the users to understand (e.g. a picture with no ALT tag). In some cases the browser was recognising text as graphics, due to the programming of the website. We may want to change what the browser says when it encounters a graphic from 'graphical link' to something more intuitive for users.

- On www.bbc.co.uk the user was able to use the next link button to skip to main content (this was a hidden link on the page), and this was very useful as it meant that the switch user could jump directly to the content area of the page rather than having to listen to a large number of links along the top and down the left hand side of the page first, which would have also incurred a large number of switch presses when 'next paragraph' button or even the 'skip 5 links' button.

- The enthusiasm of the users at the time of the trial will generally affect their ratings; for example, on this task one of the users was bored and would rather talk about sports.

- For some of the users 'pop ups' were a problem. This was a general problem as the users were not able to close the popup window independently if they were accessing via switches within this version (this problem was later rectified).

6.3.1.3 Favourites

All the users (n=17) had experience of the favourites page in the WWB. There were no negative responses for the favourites page, 11 users (65%) thought that the favourites page was very good, 4 users (24%) thought it was good and 2 users (11%) had a neutral response. 15 users were able to add a site to the favourites page, 9 users (60%) thought this was very good, 5 users (33%) thought it was good and 1 user (7%) had a neutral response. Users' responses for some of the functions relating to the favourites site are given below:

- Eight users made a comment on the picture screenshot of the new site added to the favourites page. 7 of the users found the picture good, 1 of the users would like a bigger picture.

- Six of the users commented on their general experience of using the favourites page and all the users had a good experience.

Other comments/suggestions about the favourites page:

- It is important to have a good sized picture rather than a thumbnail of the page, but this requires work on the part of the facilitator. Also larger text under the thumbnail would be better.

- A better and clearer icon for adding a site to the favourites page would be useful.

- It would be good if the user had the choice of choosing a picture themselves to be used on the favourites page.

- A larger address line for URLs would be better, as well as larger font in the address line.

- The favourites page is good but may limit the user from free browsing.

- The address bar does not remember the previous addresses like Internet Explorer, and this may be annoying for facilitators and some users. The address bar also behaves differently in that you cannot highlight parts of an existing web address and modify it. It is important to have consistency between the leading mainstream browsers and the WWAAC browser.

6.3.1.4 Summary Page

Ten users used the summary page within the browser. Half of these users gave a positive response. 4 users (40%) thought that the summary page was very good, 1 user (10%) thought that it was good, 3 users (30%) gave a neutral response, 1 user (10%) thought it was bad (10%) and 1 user thought it was very bad. Users' comments on some of the other functions are given below:

- Six users were asked whether the summary page aided understanding of the content of the web page. For 3 of these users it did, for 1 user it only aided understanding sometimes and for 2 of the users it did not aid understanding.

- Three users were asked if the summary was useful for exploring the page. For two of these users it was and for 1 user it was not useful at all.

Other comments/suggestions about the Summary page:

- It was not always possible to get web pages with a good summary, which made it difficult.

- One of the users expected the summary page to have pictures.

- A summary description of the page was not available on all websites.

- One of the users usually used a text-based interface and therefore found the summary useful whereas another user preferred pictures. This highlights the conflicting requirements between users.

- The summary page was a quick way to get an overview of the content.

6.3.1.5 Entering information online

15 of the users used the browser to enter information into a search engine. The majority of users (73%) had a positive experience of entering information online. 7 users (46%) had a very good experience, 4 users (27%) had a good experience, 2 users gave a neutral response (13%), 1 user (7%) had a bad experience and 1 user (7%) had a very bad experience.

Other comments/suggestions about entering information online:

- When entering information online, it would be useful to be able to edit text before sending it to the onscreen dialogue box. This could be particularly helpful when entering larger amounts of text onto a web page e.g. filling in a dialogue box for a film review.

- Users may need a bit of practice before they can use this function effectively.

- Two of the users found the results of a normal search engine search difficult to digest, but found it easier when searching for pictures. A study comparing existing search engines leading to recommendations for an alternative

interface that is more usable and easier to understand for AAC users would be useful.

- There is a need for a 'clear field' button so that the user doesn't have to press delete 20 times to clear the last search data

- It could be useful to have an on-line thesaurus/dictionary, as the end users may encounter complex text.

- If the user doesn't understand a word, it would be nice to be able to mark the word with a bookmark and have it explained by somebody later.

- There is nothing dangerous happening when the end users click a button. It is a nice feature that the browser warns when a pop-up site is opened.

- It would be easier if there was speech output on the selection sets.

- For one of the users the function didn't always work logically. For example, it was confusing that the 'enter' key took the user forward instead of 'tab' and that 'enter' is usually used to submit, but this was not case. The user also thought that other available software (e.g. Discover) worked better with search engines.

6.3.1.6 Exploring a long page

11 users used the scroll buttons to explore a long page. The majority of users (73%) gave a positive response when asked about the scroll buttons and there were no negative responses. 5 users (46%) thought that the buttons were very good, 3 users (27%) thought they were good and 3 users (27%) had a neutral response. Users' comments on some of the other functions are given below:

- Three users had some experience with all the different scroll buttons and all the users had a positive experience. For one of the users these additional buttons played a very important role.

Other comments/suggestions about entering information online:

- One of the users found it easier to use the scroll bar compared to the buttons as he thought it was quicker, another example of individual difference.

- For one user having all the options of scrolling proved difficult as it took longer for the user to scan through the buttons.

- One of the users was not able to hit the normal scroll bar on the touch screen, a wider scroll bar was also tried but the browser buttons were the most effective.

6.3.1.7 Frame navigation

10 users used the frame navigation using the browser. Some users did not have an opportunity to try this feature as evaluators were unable to find sites of interest with frames. When the users were asked about the focus box moving around the screen, half of the users gave a positive response. 2 users (20%) thought that the moving box was very good, 3 users (30%) thought that it was good, 3 users (30%) gave a neutral response and 2 users thought it was very bad (20%).

Other comments/suggestions about frame navigation:

- It is confusing to navigate a page with too many empty frames, but the browser works fine on simple pages.
- One of the users was a touch screen user, and for this type of user it would be better if the browser would take clicks anywhere and not only in the current frame. It was confusing that on non-frame based pages he could just point anywhere on the screen but on a frame page he had to use 'next frame' first.

6.3.1.8 Free browsing

Only 5 of the users had time to do some free browsing on the Internet using the browser. All 5 users gave a positive response, 3 users (60%) thought that the browser was very good to explore the Internet and 2 users (20%) thought that it was good.

Other comments/suggestions about free browsing:

- The favourites page played an important part in assuring a 'safe home' for the users to return to if they got lost
- One of the users had used Explorer to browse the Internet and felt that it was important not to lose their experience of browsing in the 'normal' way.

6.3.1.9 Overall perception of software

All the users (n=17) were asked if they liked the software. The majority of users (88%) gave a positive rating to the software. 8 users (47%) thought that the software was very good, 7 users (41%) thought that the software was good, 1 user (6%) gave a neutral response and 1 user (6%) thought that the software was bad.

Other comments/suggestions about overall perception:

- The negative rating was probably a result of the technical problems encountered with the scanning.
- For the majority of users the software has enabled them to browse the Internet for the first time, which is an achievement in itself.
- Through the appropriate training and support almost all users can benefit from the WWAAC software but the technical problems need to be ironed out first.

6.3.1.10Ease of use

All the users (n=17) were asked how easy they found the software to use. 8 users (47%) found the software very easy to use, 2 users (12%) found it easy to use, 3 users (17%) gave a neutral response, 2 users (12%) found the software difficult to use and 2 users (12%) found it very difficult to use.

Other comments/suggestions about ease of use:

- For one of the users it was very difficult to use the software as he does not work well when under observation and at the trial there were many people huddled round him.
- With practice the software would become easier to use.
- One of the users found it difficult to remember the functions of the buttons.
- One user experienced difficulties with her use of her head switch. The experience of evaluating software when access was unreliable proved difficult and tiring.
- For another user the software was not as easy to use because the user was so used to the 'Discover' software its functionality.

6.3.1.11Pictures on buttons

All the users (n=17) were asked about their feelings relating to the pictures on the buttons. In total only 7 users (41%) gave a positive response. 3 users (18%) thought that the pictures on the buttons were very good, 4 users (23%) thought they were good, 6 users (35%) gave a neutral response, 2 users (12%) thought they were bad and 2 users (12%) thought the pictures on the buttons were very bad.

Other comments/suggestions about pictures on buttons:

- Generally the pictures were thought to have too many colours, too much printing and too much to see.
- One of the users thought that the buttons had bad contrast that made them difficult to see.
- Not all the users could understand the meaning from the graphics, but this may improve with further training and practice.
- Many of the users would have liked to be able to use their own symbols on the buttons as they would be more readily recognisable.

6.3.1.12Layout of buttons

All the users (n=17) were asked what they thought about the layout of the buttons. Just under half of the users (n=8) were happy with the layout of the buttons. 3 users

(18%) found the layout very good, 5 users (28%) found the layout good, 4 users (24%) gave a neutral response, 2 users (12%) found the layout bad and 3 users (18%) found the layout very bad.

Other comments/suggestions about layout of buttons:

- The headmouse user found it difficult to reach all of her buttons using her headmouse.
- Tailoring the layout of the buttons for each individual will help but this would take a few sessions and the layout will change according to the increase in the individual's ability.
- Many of the users would prefer the layout of the buttons to be in a similar format to their communication aids, and some of the users would also prefer the same interface.

6.3.1.13Selecting buttons

16 users gave a response on how easy they found to select the buttons. The majority of users found it easy to select the buttons (88%). 10 users (63%) found it very easy to select the buttons, 4 users (25%) found it easy, 1 user (6%) gave a neutral response, and 1 user (6%) found it difficult to select the buttons.

Other comments/suggestions about selecting buttons:

- Motor control will be an influence on how easy or difficult the users found it to select the buttons.
- One of the users found it hard work to select the buttons as the user had only recently started to use scanning and needs more training.
- The users must understand the function of the buttons in order to select the correct one.
- For one user it was difficult to select the correct buttons to begin with but this improved after the position of the screen and their head rest mounted switch was changed.
- For one user it was easier to follow a 'red' visual focus compared to a 'yellow' one—another plus point for the adjustability of the software.
- A user using a headstick found that there were some limitations resulting from the size of the screen.

6.3.1.14Best liked aspects

8 users commented on their best liked aspects of the WWAAC software. All of these users liked the speech support given by the browser. One user liked the frames

around the spoken word/sentence. Another user specifically mentioned the fact that it promoted independence.

6.3.1.15Disliked aspects

Five users commented on aspects of the software which they least liked summarised below:

- The possibility of visiting sites that the users don't want to.
- One user disliked the scanning in general.
- One user found it difficult to differentiate between word/sentence/paragraph.
- Scanning did not work well for the user using the Discover switch
- For one of the users opening page links did not always work properly.

6.3.1.16Improvements

Eight users made comments on improvements that they think could be made for the WWAAC browser, and these have been listed below:

- Pages without faults
- Fewer problems with speech output
- Buttons have too much impression
- Better icon for link button
- Have a dialogue confirming adding a site to favourites i.e. 'do you want to add this to your favourites?'
- Quicker reading software (however the speed can be increased)
- Improve the scanning

6.3.1.17Future software use

All the users (n=17) were asked if they would use the WWAAC software again. 16 users (94%) said that they would and 1 user (6%) said they may use it in the future.

16 users were asked if they would envisage themselves using the software on their own in the future. 13 users (82%) envisaged that they would be able to use the software on their own in the future, 1 user (6%) thought that they may be able to use the software independently and 2 users (12%) thought that they would not be able to use the software on their own.

6.3.1.18Other comments

- Support of family may facilitate effective use of the software
- Introducing the software to AAC users as early as possible will help them to use the software effectively in their later life.
- Each individual is different and the tailoring of the software is one of its strong points.
- From one of the end user's point of view, she thinks it is worth the effort – she's 'knackered' now though! – but in comparison with alternatives, it was worth it.
- In the Beta evaluations, caregivers would like to have a manual in Dutch.

6.3.2 Summary and Conclusions

The general reaction of the end users to the WWB software was positive and the users could see benefits from using the browser software. Many of the users had used the Internet for the first time, and this was a result in itself. The end users provided further recommendations for the software that were brought to the attention of the developers.

As in the simulator and alpha trials, the speech support was endorsed by most users. Users appreciated being able to control the speech, but asked for more feedback on the changes made.

The browser's identification of links on a page was problematic for some users. However, this finding may have been affected by the error in the software at the time that caused the word "link" to be spoken at the same time as reading aloud the link.

The favourites page was again highly thought of by many users. A reservation was expressed that the favourites page may limit users from free browsing. However, the degree to which the favourites page is used is of course entirely optional, and it is possible to set an alternative site as a home page. For some users the favourites page may only be a safety net, while for others it may form the basis of most of their Internet experience. These sorts of issues are difficult to explore in depth within the context of a short workshop. It should also be noted that there is a facility within the browser to permit users to search for new sites on the Internet using symbol-supported items from pre-prepared selection sets. This is intended to help users move beyond the confines of the favourites page.

There were mixed feelings about the summary page. However, it is interesting to note that three users did feel it aided understanding. At the alpha phase, comments were predominantly made about its role as an aid to navigation. Clearly the information is not always available on the web page to enable the software to produce an adequate summary, and this is an area that is being addressed in the guidelines deliverable, Deliverable 12A.

As noted above, one feature designed to help users move on from the favourites page is the facility to input symbol-supported text onto a web page, and therefore conduct a search if required. The majority of users who tried this facility had a positive experience of searching on the Internet. However, users commented on the lack of clarity of the presentation of the findings of this search. On Google, for example, there is a lot of 'irrelevant' text at the top of the site, that a switch user in particular must read through before they get to their search results. A comparison of the way in which different search engines present information might be a useful exercise, and recommendations for a more usable interface may need to be produced in the future.

The scroll buttons appear to be useful for some and not so useful for others. However, the fact that one user in particular found them much better than normal scroll bars is encouraging. Some users may not have found a need for them during the trials, as they come into their own when a long page is encountered.

Frame navigation also had a mixed response, but, as in the alpha trials, some problems were due to the poor design of the websites trialled. However, there is a need for the functionality of this feature to be made more intuitive for a touchscreen user.

The fact that only five of the seventeen users had time for free browsing at the end of the workshop reflects the intensity of the evaluation process. However, it is encouraging to note that all the users who tried this did have a positive experience.

While not all of the users found the software easy to use, it appears there may have been some external influences on this. For example, difficulties with switches will affect the ease of use of any software, and one user was clearly affected by the presence of observers.

Again there was a negative response by users to the icons used. Although this comment was made at the alpha phase, it had not been possible to change these before the beta trials. However, due to the strength of feeling, these were changed for the longitudinal trials. Changing the icons was also a visible way of demonstrating to users who went on to participate in the longitudinal trials that their opinions are listened to and acted upon.

There were also some negative comments about the layout of the buttons. Although a layout editor was available for the beta trials, there was often not sufficient time available during the workshops to make many changes. It may be that with more time, some of the concerns could have been addressed. However, a key request from some users was to maintain the same interface as is used for other activities. The presence of keyboard shortcuts for functions means that to some extent, this is possible. Experimental sets were produced within SAW, for example. It was encouraging to note that despite criticisms of the button layout, most users still found it easy or very easy to select the buttons.

The most positive endorsement of the software by the users was probably the fact that, like in the alpha phase, most were keen to use the software again in the future.

Overall, the reliability of the browser software was reasonable during the beta trials, with only minor difficulties in preparing the software for the users' individual requirements—reliability is a very important factor in the future adoption and success of the WWAAC software. The WWAAC software was not compatible with all web pages but this was largely due to the poor design of these pages or presence of flash. This led to the evaluators preparing customised favourites pages that consisted of sites compatible with the browser, which was time consuming. This emphasises the importance of web developers designing web pages with accessibility and usability in mind, especially for people with disabilities, the fact that there is a working party looking into making flash more accessible is also encouraging. Consistency of some of the functions between the WWAAC browser and mainstream browsers must be maintained, as this will help the transition of AAC users who currently use mainstream software to the WWAAC software and vice versa.

Training of users and facilitators will also play an important part in the effective use of the WWAAC software. The layout editor makes it possible for facilitators to tailor the browser's function to the capabilities, limitations and preferences of each of the users. The layout editor also enables facilitators to gradually introduce functionality over a period of time, so that end users are not initially overwhelmed by the range of functions available. This flexibility is a key factor which distinguishes the WWAAC browser from the current mainstream browsers.

6.4 Beta email

6.4.1 Findings

6.4.1.1 Reading an incoming email

In total all the users (n=12) involved in beta WEM trials were able to use the WEM to read an incoming message. The majority of users had a positive experience when reading a new email message, 7 users (58%) thought it was very good, 4 users (33%) thought it was good and 1 user (9%) gave a neutral response. Below are some additional user comments related to reading incoming mail:

- Five users commented on their experience of finding the email message. 3 users had an OK experience with finding a message and 2 users had a very good experience of finding a message within their inbox.

- Eight users commented on the speech output of the software. All of these users thought that the speech was good, one of the users expressed their preference that it be a woman's voice.

- Six users commented on their experience of leaving the inbox. The responses were mixed: 3 of the users found leaving the inbox OK and the other 3 users did not like the experience of leaving the inbox.

Other comments/suggestions about reading incoming email messages:

- One user currently used Outlook Express and this user found the WWAAC software more difficult to use than Outlook. This may be because the user is familiar with Outlook and the WEM software doesn't support some of the same basic and advanced functionality. Another user who had also used Outlook Express had no problems with using WEM, and this emphasises individual differences between users.

- Having the image of the sender was very helpful for the users.

- The quality of the voice of the speech synthesiser was criticised by some of the users.

- One of the users who had used the WWB noticed a difference between the button layouts for reading text within the Email software. This was confusing for the user and raises the importance of consistency between the different WWAAC software.

6.4.1.2 Using the Address book

All of the Beta email users (n=12) were able to use the address book and comment on what they thought of it. The majority of users had a positive experience, 6 users (50%) thought using the address book was very good, 4 users (33%) thought it was good and 2 users (17%) gave a neutral response. Further comments of other functions relating to the address book are given below:

- Eight users gave feedback on their experience of finding a person in the address book. All of the users had a positive experience.

- Six users commented on the appearance of the address book. All of the users thought that the address book looked good. One of the users did not require there to be photos within the address book, but for the other users the photos were very helpful. One user thought that the photos were blurred and needed to be clearer.

Other comments/suggestions about address book:

- Users may find it difficult to configure the address book themselves.

- A user who was currently using Outlook Express would like some similar functions such as being able to send mail to more than one person, send a copy to someone, look at the address book at the same time as other windows (i.e. writing window).

- One of the users found it difficult to go back and forth between the different options.

- One of the users preferred a brighter colour round the photographs in the address book to make them more conspicuous.

- The visual focus was too narrow for some of the users and it was not possible to change its colour due to a technical error at the time.

6.4.1.3 Composing and sending a new email message

All the users (n=12) used the WEM software to compose and send a new email message. The majority of users had a positive experience of writing an email, 8 users (67%) had a very good experience, 2 users (17%) had a good experience, 1 user (8%) had a neutral experience and 1 user (8%) had a very bad experience. Users' comments on some of the other functions are given below:

- Six users commented on the experience of sending an email. All of the users had a good experience.

- The very negative response was given by one of the users because the scanning of the selection set did not work. This response, therefore, may be a reflection of the technical problems experienced within the trial rather than the functionality of the WWAAC software.

- Five users gave feedback on using the 'exchange button' to send and receive emails. All the users had a good experience of using this button and function.

Other comments/suggestions about composing and sending new emails:

- The pop up dialogue boxes when sending and receiving emails were confusing for some of the users. This is because the information given was not always simple or logical.

- Many of the users would have benefited from speech output with the selection sets.

- One of the users would have found it easier to use the vocabulary with the Discover software.

6.4.1.4 Using the 'sent' mailbox

All of the users (n=12) were able to view the sent messages in the sent mailbox. The majority of users had a positive experience of viewing sent messages, 9 users (75%) had a very good experience, 2 users (17%) had a good experience and 1 user (8%) had a neutral experience.

Other comments/suggestions about viewing sent messages:

- The confirmation feedback of sent messages was very useful for the users.

- One of the users suggested that it would be good if the software could remind the user who they had already sent a message to (e.g. by showing a photo).

- It would be useful for some of the users if the picture of the recipient was made bigger as well as the tick symbol.

- It would be useful for the software to be able to read the subject of the sent messages.

6.4.1.5 Receiving new mail

11 users were able to receive new messages through the WWAAC software. The majority of users had a positive experience when receiving new mail, 7 users (64%) had a very good experience, 3 users (27%) had a good experience and 1 user (9%) had a neutral experience.

Other comments/suggestions about receiving new mail:

- It would be useful for the some of the users if the sender of the message was displayed as well as the time and date the message was sent to the users.

6.4.1.6 Overall perception of the software

All the users (n=12) were asked whether they liked using the software. The majority of users liked using the software, 8 users (67%) liked the software very much, 1 user (8%) liked the software a bit less, 2 users (17%) thought the software was OK, and 1 user (8%) did not like the software.

Other comments/suggestions about overall perception:

- The negative response for one of the users may have been due to the fact that the user found the software difficult to use. This could be improved with further practice with the software.

- The users appreciated the effort that had gone into the software.

- Some users may require more training to be able to use the software more independently and confidently.

6.4.1.7 Ease of use

All the users (n=12) were asked how easy they thought the software was to use. The majority of users found the software easy to use, 6 users (50%) found the software very easy to use, 2 users (17%) found it easy to use, 2 users (17%) gave a neutral response, 1 user (8%) found it difficult to use and 1 user (8%) found it very difficult to use. It is envisaged that with further practice and training the software would become easier to use.

6.4.1.8 Picture on buttons

All the users (n=12) were asked about their view of the icons on the buttons within the software. 3 users (26%) thought the pictures on the buttons were very good, 4 users (33%) thought they were good, 4 users (33%) thought they were OK and 1 user (8%) thought they were very bad. Further comments from the users included:

- Too many colours
- Too complex
- Icons and pictures made it easier to use the software
- Difficult to understand what the symbols mean
- Symbols used are too similar

6.4.1.9 Layout of buttons

11 users gave feedback on the layout of the buttons within the software. The majority of users gave a positive response, 5 users (45%) thought the layout was very good, 3 users (28%) found it good, 2 users (18%) found it OK, and 1 user (9%) found the layout very bad.

6.4.1.10Selecting buttons

All the users (n=12) were asked how easy they found to select the buttons. The majority of users gave a positive response, 8 users (67%) thought it was very easy to select the buttons, 2 users (17%) found it easy, 1 user (8%) found it OK and 1 user (8%) found it difficult.

6.4.1.11Speech support

All the users (12 users) were asked what they thought of the speech support. The majority of users found the speech support good, 7 users (58%) found it very good, 3 users (25%) found it good, and 2 users (17%) found it OK.

Other comments/suggestions about speech support:

- Speech support was very helpful for most of the users.

- One user preferred a female voice, and the quality was not as important for this particular user.
- Some users did not like the quality of the voice.
- The controls for the speech support (volume up/down, speed increase/decrease) were found to be useful.
- One of the users would like to switch the speech support off when going into the inbox or outbox.

6.4.1.12Best liked aspects

Five users gave feedback on their best liked aspects within the WWAAC email software. Below are the aspects these users best liked:

- Speech synthesiser support
- Receiving new emails
- Address book
- Vocabulary
- Sending email using bliss

6.4.1.13Disliked aspects

3 users provided feedback on aspects of the software that they disliked, and these are listed below:

- One of the users disliked the fact that the WWAAC software did not have advanced functions like attaching files, sending to more than one person and being able to see more than one window at a time.
- One user disliked the design of the speak button, a picture of a mouth would have been enough for this user.
- For one user the scanning was not reliable enough and the settings were not easy to configure.

6.4.1.14Improvements

4 users suggested improvements that could be made to make the software better. These are listed below:

- One of the users would like a speech button that when chosen confirms the use of speech
- Better clearer icons

- Reliable speech synthesiser
- Make groups within address book

6.4.1.15Future software use

The users were asked whether they would like to use the software in the future. 10 users (83%) said yes they would like to use the software in the future, 1 user (8%) said maybe and 1 user (8%) said not sure.

6.4.1.16Independent use

The users were asked if they could imagine using the software on their own after more training. 10 users (83%) said yes they could imagine themselves using the software on their own and 2 users (17%) said no they couldn't use the software on their own.

6.4.1.17Other comments

- Users who had not used email before were delighted to receive and read new emails as well as to reply.
- It needs to be investigated whether users could in the future use their AAC device to communicate with the WWAAC software.
- Personal vocabulary is needed so somebody needs to do the time-consuming task of preparing or adapting selection sets for individual users.

6.4.2 Summary and Conclusions

This was the first time email software had been trialled with users during the WWAAC project. As with the WWB, the majority of users were very positive about the WEM software overall, and most felt they would want to use the software again in the future.

The majority of users felt the software was good at dealing with incoming mail. However, some users found it difficult to move away from the Inbox. This may be due to the fact that the software was explored over a half day workshop only, so getting to grips with moving between mailboxes would be a considerable challenge for such a short time period. However, this clearly needs to be monitored in the future.

The address book performs a similar function to the favourites page in the browser, and like the favourites page, most users liked this feature. A few suggestions for improvements were made, including the use of higher resolution graphics for the photographs.

Most users felt positive about composing a short email. Although one user felt very negative about this, this was probably due to the fact that a technical error prevented

him from selecting vocabulary using his switch. The use of the 'exchange' button, which some had feared might introduce an additional level of complexity, was not identified as a problem by any user. The information presented to users whilst the exchange process was taking place, however, was criticised.

Users recommended having photographs of senders and recipients in the mailboxes. This functionality was intended, but at the time, question marks were appearing instead. This was implemented at the time of the longitudinal trials.

The majority of the users felt positive about the email software. One user did not like it, but the evaluator reported that they had found it difficult to use the software, and that their opinion might have changed had they had the opportunity to become more familiar with it. Training was again raised as an important issue for consideration.

A number of users expressed a neutral opinion about the icons used, and one felt they were very bad. Comments made were similar to those made of the icons in the WWB.

On the whole, the layout of buttons and their selection did not raise significant problems, although one user in each case felt they were very bad. Like with the WWB, speech support was helpful for most users, and for one user was their best liked feature.

The functionality is basic compared to the mainstream email software, and advanced functions, such as setting up groups in the address book, are not available with the WWAAC software. Users who have experience of such functionality and find they cannot use this in WEM may be critical towards the software as a result. However, the beta trials have demonstrated that WEM can facilitate more independent use of email facilities by users.

The feedback provided by both users and facilitators were relayed to the developers, to enable changes to be made to the software prior to the longitudinal trials. The email software was not as reliable as the researchers would have liked it to have been, and a few of the scheduled email trials had to be cancelled for this reason. It is important for the email software to be as reliable as mainstream software to enable users to make effective and consistent use of it.

Early indications are that the email software may have the potential to meet the needs of some people who use AAC. This will be explored in more detail at the longitudinal phase. The flexibility of the layout editor, which allows facilitators to tailor the functionality and interface for individuals, and to gradually introduce functionality, was endorsed by most of the facilitators.

6.5 Facilitator interviews

6.5.1 Findings

6.5.1.1 Promoting independence for AAC users

The facilitators were asked whether they believed that the WWAAC software promoted independence for AAC users. All 9 of the facilitators (100%) believed that the WWAAC software did promote independence for AAC users. The additional comments made were:

- The software needs to be stable and reliable.
- The software would facilitate more independence but not complete independence.

6.5.1.2 Sufficient functionality

The facilitators were asked whether they thought that the WWAAC software had sufficient functionality to support AAC users. 8 (89%) of the facilitators thought the WWAAC software did have sufficient functionality to support the users and 1 facilitator thought 'it was too early to say'. The additional comments made were:

- Yes the software would provide enough functionality but after good instruction.
- The software provides adequate functionality when it is reliable.
- Software will have sufficient functionality after the improvements recommended have been made.
- The software provides ease of use for switch users.

6.5.1.3 Effective operation

The facilitators were asked whether they thought that the users had been able to operate the software effectively. All of the facilitators questioned (8) thought that the users were able to operate the software effectively. The additional comments made were:

- The users were able to operate the software effectively but there are not enough web pages that are compatible with the software.
- The users' performance with the software will improve with time.
- The users required more training with the email software.
- Users with lower cognitive abilities would require more support.

6.5.1.4 Effort required

The facilitators were asked whether they thought the effort required to operate the software was acceptable. 8 facilitators (89%) thought that the effort required was acceptable, 1 facilitator (11%) thought the effort required 'may' be acceptable but the facilitator was not sure. The additional comments made were:

- Whether the effort required is acceptable will depend on the enthusiasm of the user.
- The user who is very interested but has poor motor skills will become motivated by this.
- The users will require more training with the email for the effort to be acceptable.

6.5.1.5 Ease of use

The facilitators were asked whether they thought the software was easy for users to operate. 8 facilitators (89%) thought the software was easy for users to operate and 1 facilitator (11%) was not sure due to the level of training required for effective use. The additional comments made were:

- The software will be easy to operate if the users are given appropriate training and practice.
- Icons on the software not as clear as they could be.
- Too many functions in email.
- Certain parts of the software will require a lot more training.

6.5.1.6 Confusing aspects

The facilitators were asked to help identify any aspects of the software that would be confusing for the users. 7 facilitators (78%) suggested aspects that may be confusing for the users, and these have been listed below:

- Users need to have adequate general knowledge about computers and the Internet to avoid confusion (i.e., links, frames, etc.)
- With the email software when sending an email the user has to select 'send' and then 'send and exchange' so for sending there were two steps required.
- The speech synthesiser does not always read all the words in the case of email.
- With the email the order of the messages in the 'in' and 'out' boxes is not according to the time it was received or sent. (Other email software would allow such a choice)

- The lack of information about the sender of the email.
- Navigating between the areas on a web page is difficult; the scanning is the aspect that requires a lot of training.
- The meaning of the icons is not clear. Users should be given the option to use symbols they prefer (i.e. Bliss, PCS, Rebus, etc.)

6.5.1.7 Comparison with alternatives

The facilitators were asked whether they considered the WWAAC software to be a better option than the alternatives. 8 facilitators answered this question and all of them viewed the WWAAC software to be better than alternatives. Many of the facilitators said that they were not aware of any alternatives available and the WWAAC software was pioneering this specific market.

6.5.1.8 Frustrating aspects

The facilitators were asked if there were any aspects of the software that were frustrating to use. 5 facilitators gave feedback on frustrating aspects, and these are summarised below:

- Not all web pages can be spoken out.
- With the email software it is not possible to go back (undo).
- The absence of time and date of messages.
- The speech synthesiser crashes occasionally.
- Lack of clarity within the icons.
- The software is not very reliable as it crashed very frequently. A master reset option may help.

6.5.1.9 Additional features

The facilitators were asked if they could think of any additional features that are needed to improve the software. 6 facilitators suggested improvements, and these are listed below:

WWB:

- Enabling the operation of the media player when playing sound files.
- When a link is selected a pop up could be displayed confirming if the user wanted to go there.

Email:

- Being able to send attachments with emails.
- Being able to use ‘smileys’ with emails.
- With the email software being able to add somebody to the addressbook from the inbox.
- Having a field for the mail address when not selecting from the addressbook.
- Having the option to listen to the information about incoming mail.
- Email exchange with ‘normal’ plaintext email programs.

Both WWB and WEM:

- Being able to communicate between languages.
- Have a clearer speech synthesiser taking into consideration local accents.

6.5.1.10Repeat use

The facilitators were asked whether they thought the users would continue to use the software again if given the opportunity. All 9 of the facilitators thought the users would be willing to use the software again.

6.5.1.11Market for software

The facilitators were asked whether they thought there was a market for this software. 8 facilitators (89%) perceived a market for this software, 1 facilitator (11%) said that they did not know.

6.5.1.12Layout editor

The facilitators were asked to comment on what they thought about the layout editor, if they would like to use it and if they thought they would have time. All the facilitators said that they thought the layout editor was useful and they envisage that they would have adequate time to use it.

6.5.1.13Other comments

The facilitators were asked if they had any other comments that had not been covered in the interview. The comments that have not been covered earlier were:

- Having the option of speech feedback to read the text for each button while scanning.
- Installation needs to be simple and come with an easy step-by-step guide.

6.5.2 Conclusion

All of the facilitators were positive about the WWB and WEM software, and they felt the software could be of benefit to people with complex communication needs. The reliability was deemed very important, as was training of facilitators and users of the software, for them to be able to use it effectively and independently.

The layout editor is essential to allow the software to be tailored for each of the users, and it was endorsed by the facilitators. The facilitators would require some training to ensure they are comfortable with all of the functions and features of the layout editor. An easy to use 'user manual' would also contribute towards the effective training of the facilitators.

The facilitators also thought that there was a market for this software. This is encouraging for the developers as it adds a financial element to the moral justification of developing such software. There were no major problems identified by the facilitators, which is reassuring. The more short-term issues are the need to make the software more robust, followed by integration of existing hardware and the users' own software and symbol sets, to the greatest extent possible.

6.6 Update on Web and Email Accessibility Software

6.6.1 Introduction

A detailed overview of developments in Web and Email Accessibility was provided in D2 User Requirements Document, Sections 4 & 5. As the project has progressed, we have become aware of other developments, and new products have appeared on the market. This sub-Section provides an update to the detailed work completed in 2002.

6.6.2 Screen Readers

Section 4.1.2 in D2 User Requirements Document included some information about screen readers. Through the evaluation process, we have discovered that a number of institutions are making use of screen readers that have been predominantly designed to meet the needs of people with literacy or learning disabilities rather than people with visual impairments, to facilitate access to the Internet and Email. Two notable examples include Read & Write from Text Help and Reader from Sensory Software:

- Read & Write is a screen reader from Text Help that is designed for people with literacy or learning disabilities. The toolbar 'floats' on top of an open application. The web highlighting facility means that end users can experience dual colour highlighting as html documents are read aloud. www.texthelp.com.

- Reader from Sensory Software is a screen reader that speaks aloud any text copied to the clipboard. If a symbol library is installed, it can display symbols next to the words. http://www.sensorysoftware.com/software/reader/index.html

Another screen reader development from TextHelp is Browsealoud. This combines a tool for web developers with software for end users. Once web developers have enabled their site with this software, an end user with the software can hear any text on the page by positioning their mouse over it.

6.6.3 Alternative Browser Applications

Section 4.1.3 of D2 User Requirements Document gave an overview of a range of alternative approaches to Web Browsing. A number of additional applications could be added to the list of examples, including:

- WebbIE, a web browser based on Microsoft's Internet Explorer for blind and visually-impaired people. It allows you access to the vast majority of webpages and tries to present all the information there simply and easily so you can explore and use the web fully. WebbIE re-presents the information from a web page in an accessible format suitable for a screen reader - a panel of plain text. Free to download from http://www.webbie.org.uk/

- AVANTI Browser, provides accessibility and high quality interaction to all potential users through a single unified browser interface. It employs adaptability and adaptivity techniques at both lexical and syntactic levels, to address the different abilities, skills and diverse requirements and preferences of a wide range of users, including disabled and elderly people. It is a lab-tested system only with no open field trials. Industrial exploitation is planned. http://www.ifac.cnr.it/avanti/contents/contents/index.htm

- WebTrek, provides pictorial support for navigating the web. It is designed for people with learning disabilities or literacy difficulties. A graphical favourites page is used, and end users can add sites to the favourites page independently. There is a link to a picture based search engine (which can be accessed from other web browser – www.webtreksearch.com/startpage.asp). The number of functions appearing on the toolbar can be customised, and there are audio prompts for using the buttons. There is no internal scanning or screen reader. www.ablelinktech.com.

Significantly, a new web browser has been developed by Widgit for people who use symbols to support their communication (http://www.widgit.com/products/webwise/browser.htm). Unfortunately, Communicate Webwide has not yet been released, so we have been unable to do a formal comparison with the WWAAC Browser. However, we understand that it will be available later this year. Communicate Webwide takes a different approach to facilitating web page access to the WWB by offering the option to users of extracting information from web pages and presenting it in a single column. It is then possible to change the presentation of the information, for example, by viewing the text at any size or viewing symbol support. Webwide comes with Widgit Rebus symbols, but with another piece of software, it is also possible to view PCS symbols. Two favourites lists are available – one for personal use and one for shared use. It is possible to associate a graphic with a website on the favourites list.

6.6.4 Email Accessibility

Section 5.0 in D2 User Requirements Document considered developments in Email, Echat & discussion group accessibility. Two additional applications should also be noted:

- IcanEmail, an email application designed for people with learning disabilities, visual impairments and reading difficulties. It employs a wizard approach, leading the end user through composing or receiving emails one step at a time, speaking instructions out loud. The user interface is bold and colourful, but is not flexible. There is a text-to-speech facility for incoming emails. End users are supported in composing emails by offering a recording facility, and keystroke echoing followed by word-by-word text to speech when typing an email. End users are also supported in attaching pictures to their emails. There is no internal scanning facility. http://rjcooper.com/icanemail/index.html.

- WebTrekConnect, an email application designed for people with reading and learning disabilities. There is a photographic address book, and is designed to enable people to easily send audio emails. It is possible to control how much functionality appears on the toolbars. A text-to-speech facility enables incoming emails to be read aloud to the end user. There is no internal scanning facility. www.ablelink.com

6.7 Summary and Conclusions

The general reaction of the end users and their facilitators to the WWB and WEM was positive and the users identified benefits that would result from using the software. Many of the users had used the Internet for the first time, and this was a result in itself. The end users and facilitators provided further recommendations for the software, and these were fed back to the developers throughout the evaluation process. This enables changes to be made before the start of the longitudinal trials.

The reliability of the browser software has been reasonable, with only minor difficulties in preparing the software for the users' individual requirements—reliability is a very important factor in the future adoption and success of the WWAAC software. The WWAAC software was not compatible with all web pages, but this was largely due to the poor design of these pages or presence of flash. This emphasises the importance of web developers designing web pages with accessibility and usability in mind, especially for people with disabilities. The beta version of the WEM was not as reliable as hoped, but the technical partners worked hard to remedy the difficulties.

Training of users and facilitators will play an important part in the effective use of the WWAAC software. Introducing the software to users will be helped by the layout editor, which enables facilitators to gradually increase available functionality over a period of time. The layout editor also makes it possible for facilitators to tailor the browser's function to the capabilities, limitations and preferences of each of the users. An easy to use 'user manual' would be of assistance.

The facilitators felt that there was a market for this software. This view is further reinforced by the relatively few comparable adapted applications on the market

revealed by the comparison process. This is encouraging for developers as it adds a financial incentive and an exploitation opportunity to the non-commercial, inclusive justification for developing such specialist software.

Although the picture is changing and developing all the time, the updated information in Section 6.6 indicates that developments designed to meet the needs of people who use symbols to communicate remain rare. However, the development of Widgit's Webwide Communicate is encouraging. Widgit have been involved in the CCF workshops and have expressed an interest in participating in related follow up activities.

7 LONGITUDINAL TRIALS

This Section summarises the results of the longitudinal phase in which the WWAAC browser and email software were evaluated through a series of longer term end user trials. Users involved in the longitudinal phase were using the browser software and some of these users were also able to use the email software during their trials, this is summarised in the table below:

Country	Browser	And email
Holland	5	5
Sweden	3	2
UK	2	1 (email only)
Total	11	8

The longitudinal trials where the WSW was integrated with the WEM are presented in Section 8.

The longitudinal phase consisted of 11 individual AAC users, all 11 users used the browser software during the trials and 7 of these users used both the browser and email software, 1 of the users only used the email software during the trials. The age of the users ranged from 11 to 36 years old and the mean age was 21 years old. In total there were 7 male and 4 female end users involved in the trials. 6 out of the 11 users (55%) had been involved in the beta evaluation phase. 9 out of 11 users (81%) had had some experience of the Internet either at school or home. Over half of users achieved access with support (55%) prior to participating in this study.

The detailed methodology for the longitudinal trials can be found in Section 9 within Deliverable 13 'Final user interface report: The evaluation plan'. It was decided that an individual case study approach is particularly relevant for use with end users. Each user from each country will therefore be discussed individually. This will allow an in depth insight into the effect the WWAAC software has had on the user's independence and quality of life.

Section 7.1 presents findings from trials with users in the UK. Section 7.2 presents findings from trials with users in the Netherlands. Section 7.3 presents findings from trials with users in Sweden. Section 7.4 summarises some of the key findings, and Section 7.5 presents some conclusions.

Log files were collected for each of the Users, but due to the compression of the longitudinal trials and their resulting late finish, there was insufficient time after their completion for full analysis.

The appendices contain:

- Appendix 11 – Summary of the users involved in the longitudinal trials and the integration of their user profiles
- Appendix 12 – Sample Log File

7.1 Users in the UK

There were 3 users involved in the longitudinal trials from the UK. One of these users had been involved in the simulator studies phase and one user had been involved in the beta phase. User 1 and 2 only used the browser software during the longitudinal phase, user 3 used the email software.

7.1.1 UK User 1

7.1.1.1 User Profile

User 1 is a 22 year old male with spastic quadriplegia from birth. He has normal vision, hearing and oculo-motor abilities. He uses a single switch to access the computer and requires support with access. He has good receptive language abilities and is of a limited literacy level (a few hundred words and some basic spelling skills). His use of the Internet was mainly at school and he achieves Internet access with support.

7.1.1.2 WWAAC Software Used

User 1 used the browser software during the longitudinal trials, the researcher's attempts to install the email software failed due to technical issues at User 1's college. The trials were conducted over 5 weeks of which the user used the software for 3 weeks. This was due to the Easter vacation (two weeks duration), which fell two weeks into the longitudinal trial. The user had weekly access to the WWAAC browser during an IT session.

Figure 7.1. UK User 1's Favourites Page

7.1.1.3 Interests

User 1 was a big fan of Manchester United. In addition to this he liked music and artists like Britney Spears and Kylie Minogue.

7.1.1.4 Internet Experience

User 1 had heard of the Internet, the World Wide Web and links. He used the Internet about once a week and required support for access. He used Internet Explorer to access the Internet and used the Internet for entertainment (e.g. games) and hobbies.

7.1.1.5 Fortnightly User Interview 1

User 1 had used the browser once a week and visited the websites on his favourites page (Manchester United, Britney Spears etc.). The main problem the user had was that he was unable to use the software with his own login. This was due to the software being installed using the supervisor login and therefore was only available to the supervisor. This did not cause a major problem as User 1 was still able to access the browser software, but it was an inconvenience.

User 1 had used most of the functions listed below and any problems encountered with these functions have been outlined:

- Reading text with speech synthesiser –speech synthesiser not reading all the time
- Using links –links were not always working
- Favourite page –added site but this crashed the software
- Entering information online
- Going to new sites

The user suggested that the scanning should be made more reliable in order to improve the software. The user was happy to continue to use the browser software.

7.1.1.6 Final User Interview

User 1 had one more session of use before the final user interview (3 sessions in total). Overall he did like using the browser and particularly liked the buttons. He found the browser OK with regards to ease of use and thought that it could be improved if the scanning was more reliable.

He felt that he is more independent in using the Internet now using the WWAAC browser compared to before and preferred the WWAAC browser to Internet explorer. He would want to continue using the WWAAC software and has requested if the software could be installed on his home computer so that he could use it when he leaves college this summer.

7.1.1.7 Evaluator observations

User 1 displayed great enthusiasm from the start to the end of the longitudinal trial. In addition to his weekly access he also wanted more frequent access, he was keen to use the browser at every session. It was interesting to note that user 1 was able to use the WWAAC software with ease after he returned from the two week Easter vacation, this demonstrates that the user remembered how to operate the software easily.

At the end of the trial the user was able to demonstrate his ability to use the browser to access his favourites, enter information online, add new sites to his favourites and surf the net with ease. The problems encountered were of a technical nature; examples of this are the scanning not working properly and web pages visited not being designed with accessibility in mind. User 1's independence in using the Internet has definitely been increased when using the WWAAC browser.

7.1.1.8 Facilitator comments

The facilitators have been positive about the WWAAC software and have appreciated the benefits that such software can provide for AAC users. The facilitators would need to be trained up and supported in using the WWAAC software and configuring it for individual users.

7.1.2 UK User 2

7.1.2.1 User Profile

User 2 is a 21 year old male with Athetoid Cerebral Palsy from birth. He has normal vision, hearing and oculo-motor abilities. He is a two switch user and achieves access with support. He has good receptive language abilities and his literacy is of a preliterate level (limited use of symbols and pictures only). He has had no previous experience of using the Internet.

7.1.2.2 WWAAC Software used

User 2 used the browser software during the longitudinal trials. The researcher's attempts to install the email software failed due to technical issues at User 2's college. The trials were conducted over 5 weeks of which the user used the software for 3 weeks. This was due to the Easter vacation (two weeks duration) which fell two weeks into the longitudinal trial. The user had weekly access to the WWAAC browser during an IT session.

7.1.2.3 Interests

User 2 is interested in films and particularly likes the Lord of the Rings, Harry Potter and the Simpsons. He also likes to listen to music and likes S club 7 and Shakira.

7.1.2.4 Internet Experience

User 2 had heard of the Internet, the World Wide Web and Email. He has no use of the Internet but he would like to use it for entertainment and hobbies.

7.1.2.5 Fortnightly User Interview 1

User 2 had used the browser once a week and visited the websites on his favourites page (Simpsons, Lord of the Rings). He had experienced some problems in scanning and this was due to facilitator being unable to configure the scanning correctly but this was resolved later. The facilitators did receive some training from the evaluators but needed on hand support to resolve such problems as they did not have any extensive previous experience in using the software.

User 2 had used some of the browser functions during his sessions which are listed below and any problems encountered with these functions have been outlined:

- Reading text with speech synthesiser – speech synthesiser reading hidden links
- Using Links
- Favourites page
- Going to new sites – Sites did not always work with browser.

User 2 suggested more reliable scanning to make the software easier to use. He was happy to continue using the browser software.

7.1.2.6 Final User Interview

User 2 in total had 3 sessions using the browser at the time of his final interview. Overall he liked using the browser and particularly liked the large buttons and visiting websites. User 2 found the software very easy to use but thought that it could be improved if the scanning did not crash as often.

User 2 felt that he was able to use the Internet more independently than before as he was not able to access the Internet at all with the conventional browsers. He would like to continue using the WWAAC software and is very happy about it.

7.1.2.7 Evaluator Observations

User 2 was not very familiar with the concept of the Internet as he had never used the Internet before. He did not seem as enthusiastic about using the software as user 1 at the start of the trial.

At the end of the trial user 2 showed that he had mastered his switch use and was able to navigate quickly around the browser. He visited websites that he was interested in and was excited when he heard about the things that he was interested in. It was encouraging to see user 2 using the browser with ease when he returned from his Easter vacation. He had come a long way from the way he was at the start of the trial and has demonstrated that with adequate support users who do not seem

to be as keen or do not have any previous Internet experience can benefit from using the WWAAC browser. This would not have been possible with mainstream browsers.

7.1.2.8 Facilitator comments

The facilitator was impressed by user 2's switch selection. User 2 had been able to grasp the concept of links and web pages successfully with little previous experience. Again adequate training and support for the facilitators would ensure that the users are not exposed to unnecessary technical problems.

7.1.3 UK User 3

7.1.3.1 User Profile

User 3 is a 21 year old female with Quadriplegic Cerebral Palsy from birth. She wears glasses (corrected vision) and has normal hearing and oculo-motor abilities. She uses a single head switch and has good receptive language and cognitive abilities. Her literacy is limited (basic vocabulary of few hundred words and some basic spelling skills). She has no extensive previous experience of the Internet but had used the WWAAC browser during the Beta phase. She has also observed others making use of the Internet quite extensively.

7.1.3.2 WWAAC software used

It was planned that user 3 would use both the email and browser software during the longitudinal trial but due to a key facilitator being off sick as well as an external audit being conducted at the college she was unable to use both and had to stop using one, the email was selected as the software she would continue to use. Results from the early use of the browser software have been reported.

7.1.3.3 Internet/Email Experience

User 3 had heard of the Internet, the World Wide Web, Email, Inbox and Outbox. She could not remember what 'links' were so the evaluator explained this to her. She generally uses the Internet once a week with help from her facilitator who operates Internet Explorer for her. She has also watched a lot of people use the web at home and at college. She uses it mainly for entertainment.

User 3 uses email about twice a week, sending and receiving emails from home. Her facilitator reads aloud incoming emails and new messages are composed by her facilitator directed by her. User 3 currently uses email to write to her family but would like to write to friends and college staff as well.

7.1.3.4 Fortnightly User Interview 1

User 3 had used the browser once and had visited websites on her favourites page. The main problem she had with the browser was that it crashed a lot. She used the following functions:

- Reading text with the speech synthesiser
- Using links
- Favourites pages

The main improvement that would make the browser easier to use is to make it more reliable and stop it crashing so much.

User 3 sent two emails and received lots of general emails sent to 'all' on the college server but none from friends or family. She used the email software to send a couple of practice emails. The problems with the email were that the scanning was not working properly and the vocabulary disappeared. User 3 found the symbol set helpful in writing emails, the selection does need updating with more personal words.

User 3 was happy to continue to use the browser and email software.

7.1.3.5 Fortnightly User Interview 2

User 3 had just got back from her Easter vacation and had not had the opportunity to use the software since the last interview. User 3 chose to spend the time going through the email software. An informal interview was carried out and the main points are outlined below:

- User 3 felt the email software was 'okay'
- She felt she couldn't do what she wanted to do. The problem was the speech. Even though we slowed down the speech synthesiser, she found it difficult to understand. For a long email, listening to the whole email is too much to concentrate on and follow, but reading it sentence-by-sentence is too inefficient. User 3 would prefer a paragraph-by-paragraph function.
- User 3 would like to be able to write the email on her communication aid (currently a Cameleon with Talking Screen).
- She had not received any personal emails – just the emails sent to 'all' on the college server.

Technical problems were also identified and have been listed below:

- Scanning was unreliable e.g. when composing an email it stopped scanning the selection set. We had to cancel the email, close down the software and reload it to resolve the problem.

- If you don't select 'Delete mail from server after receiving it' in the settings, you end up with duplicate copies of emails in your inbox each time you press 'exchange'. However, we were reluctant to select 'delete mail from server' as this would have meant the user would not have been able to access all her mail using her college account. It might be useful to have a setting to ensure that no messages are duplicated in the inbox.

- The screen reader stopped half way through an email when it encountered a space then a full stop then a comma.

- When checking emails, each time you return to your inbox, it takes you back to the top of the list. This is inefficient for a single switch user who has to repeatedly select 'next' to get back down to the next unread email. A 'skip to first unread email' button might get round this problem.

7.1.3.6 Final User Interview

User 3 had predominantly made use of the WEM during the trials and so did not answer questions on the browser. She did like using the email software and particularly liked the photos in the addressbook. She has made the following suggestions:

- Photos shown in mailboxes too small – make them larger

- Paper and envelope icons not clear – User 3 suggested that a tick and cross would be clearer

- Would like the screen reader just to read the subject line and the author of the email, and not the date and time

- Would be better if the software autoscanned through the inbox rather than the user having to press next repeatedly.

- Make the scanning more reliable.

User 3 found the software 'OK' to use as it was easy to remember what to do but she found it difficult to do it. The user found the symbol support helpful in writing emails. However, having symbols appear above an incoming email was not helpful and it caused her confusion.

The user believed that using the WWAAC email software has enabled her to be more independent. She felt that the WWAAC email was better than having to access email through standard application with the help of a facilitator. She would be very happy to use the software again and would like to continue using the software.

7.1.3.7 Evaluator observations

User 3 remained enthusiastic about the software throughout. The college were very enthusiastic and supportive of the project, but it was difficult to provide the regular support she required to get going with this software. The trial was interrupted by an OFSTED inspection which lasted a week, and caused staff members to be very preoccupied in the weeks leading up to it, by the fact that the key facilitator who could have worked with the user more regularly was off ill for a period of weeks prior to Easter, and the fact that there was a 3 week Easter holiday in the middle of the trial.

As the software is not very compatible with the network, we had to always use the same computer during the trial. The college is not really set up for this, and it meant that we sometimes had to work in a classroom while a class was going on. For the software to be successful in a school or college setting, being able to log on, use the software and access your settings, etc., at any computer is important.

We really focussed on the email software as given the lack of use, trying to discuss and encourage familiarity with two different pieces of software in the time available would have been impossible.

There were recurring problems with scanning the selection set when composing an email.

The lack of auto-scan through options on the addressbook and mailboxes and the reliance on ‘next’ buttons is a major problem for single switch users. This could have an adverse impact on motivation to use the software in the long term, but this is hypothesis only.

It was encouraging how familiar user 3 became with the software, and how she appeared to remember it after the long break. However, she did not have an opportunity to use the software without either the evaluator or her speech and language therapist working very closely with her. So it is not possible to say with any certainty how well she would be able to use the software without close and focused one-to-one support. However, the evaluator envisaged that she would have been fine.

7.1.3.8 Facilitator comments

The facilitators agreed that the WWAAC software gave user 3 more independence. The main problem from their point of view was the inability of the software to autoscan on the web pages or emails (inbox) in order to reduce the number of times ‘next’ would have to be pressed, and the fact that it was not very easy to use on a network. The User did not get the one-on-one support that had been intended due to one of the facilitators being off sick, and this extra support would have made it easier for user 3 to use the software more regularly.

The main improvement required is to make the software more reliable; however both the email and browser were considered as invaluable resources.

7.2 Users in the Netherlands

There were 5 users involved in the longitudinal trials from the Netherlands. Two of these users had been involved in the Beta phase. All 5 users used both the browser and the email software.

7.2.1 NL User 1

7.2.1.1 User Profile

User 1 is a 17 year old female with Diplegia from birth. She has normal vision and hearing but has difficulty with oculo-motor abilities in particular scanning in all directions. She is a direct access user who uses a modified pointer and voice amplifier. She has good receptive language and cognitive abilities and her level of literacy is between limited (basic vocabulary of a few hundred words and some basic spelling skills) and fluent (vocabulary in excess of a thousand including symbol embellishment and use of grammar). The symbol set user 1 uses is Bliss.

7.2.1.2 WWAAC Software Used

User 1 used both the WWAAC browser and email software.

7.2.1.3 Internet experience

User 1 has used the Internet at school and achieves access independently.

7.2.1.4 Fortnightly user interview 1

User 1 had used the browser between 1 and 5 times a week and she had used it to visit school and news sites for kids. The problem reported at this interview was an access violation error which made it difficult for her to close the browser. She used the following functions and any problems reported relating to these functions have been outlined:

- Reading text with speech synthesizer – had a problem with reading paragraph occasionally.
- Using links
- Favourites page

The problem with reading the paragraph was resolved with help. User 1 suggested that the browser and the symbol news website could be improved if the time it took to read from word to word was shorter and if it was possible to read the word more than once.

User 1 used the email software to send between 1 to 5 emails a week and mainly emailed the evaluator. The user used the following functions in the email software, any problems with the functions have been outlined:

- Reading a message from the inbox
- Using the addressbook – Email address of one of her friends disappeared

- Composing and sending a new email message
- Viewing sent messages in sent mailbox
- Sending and receiving using 'exchange' button

User 1 liked the symbols on the buttons and was happy to continue with both the browser and email software.

7.2.1.5 Fortnightly User Interview 2

User 1 had used the browser 1 to 5 times a week, she used it to do homework and schoolwork. In addition to the functionality she had used at the last interview she had started to visit new sites. She did encounter some problems which have been listed below:

- Speech synthesizer – Some words are not read out
- Favourites – Delete favourites button did not work

User 1 did not find the symbol support on the news site helpful because the speech output was word by word and she would prefer it to read out a whole sentence. User 1 had stopped using the browser because it was not working with all of the websites she would like to visit. This needs to addressed to encourage her to continue to use the browser.

User 1 sent between 1 and 5 emails a week; she emailed friends, family and the evaluator. She used all the functionality available, as reported in the first interview, and only had one problem with the text from the sender being read out when she was replying to the message. The settings configuration were changed to resolve the problem. User 1 did receive junk emails. She would like to type and be able to see the relevant symbol and be able to see the name of the recipient in the line after selecting the address if she had no photo for them.

User 1 would be happy to continue using the email software but was not happy to continue using the browser software. This was because the browser was not as reliable as Internet explorer. She liked the email software because she gave importance to receiving mail in bliss symbols.

7.2.1.6 Final User Interview

User 1 liked using both the WWAAC browser and the WWAAC email software. She found the software quite easy to use but it could be improved if the browser was made more stable and reliable and if it was possible to send attachments in the email program.

User 1 felt that she was already independent prior to using the WWAAC software as she had Doc reader on her computer and using the WWAAC software has neither increased nor decreased her level of independence.

User 1 would be happy to use the email software again but not the browser due to its temperamental nature.

7.2.1.7 Facilitator Comments

The facilitator for user 1 was her mother. She felt that the WWAAC software did give all the sufficient functionality needed by their users and facilitators. User 1 could already use the Internet prior to the trial; therefore her independence in accessing the Internet has remained the same. She felt that the end users could learn to use the software quickly and easily. User 1's mother was overall very positive, particularly about the WEM, as it enabled user 1 to communicate using symbols.

7.2.2 NL User 2

7.2.2.1 User Profile

User 2 is a 26 year old male with Quadriplegia from birth. He was involved in the Beta phase of the WWAAC project. He has normal hearing and vision but has difficulty with his oculo-motor abilities in particular scanning in all directions. He is a single switch user which he activates using his right foot and he requires support with computer access. He possesses good receptive language and cognitive abilities and his literacy level is limited (basic vocabulary of a few hundred words and some basic spelling skills). He has had no use of the Internet in the past.

7.2.2.2 WWAAC Software Used

User 2 used both the browser and the email software during the trial.

7.2.2.3 Previous Internet Experience

User 2 has had limited experience of the Internet from taking part in the Beta evaluation phase.

7.2.2.4 Fortnightly User Interview 1

User 2 used the browser about once a week to get information about football or visit the symbol news website. He used the following functionality and any problems with these have been outlined:

- Reading text with speech synthesizer – Problems with operating this, if the user kept the button pressed for too long the function stops working.
- Using links
- Favourites Page

The user did not particularly like the symbol news site as he had to click word for word to get it working and he also did not like the kind of news. The general problem that the user encountered was selecting buttons using his switch.

User 2 sent one email per week to friends or the evaluator. He felt that he required a larger vocabulary but this would prove difficult for him to use. User 2 used the following functions in the email program and any problems have been outlined:

- Reading a message from the inbox

- Using the addressbook
- Composing and sending a new email message – required a lot of help in composing the messages

The user was not happy to continue to use either the browser or the email software but was given the option if he wanted to.

7.2.2.5 Fortnightly User Interview 2

User 2 has been ill for two weeks and has had one week of Easter vacation. User 2 has used the browser twice since the last visit for jokes and football information. He has used the same functionality as previously but has experienced further problems with scanning and selecting buttons. This made it very difficult for user 2 to operate the software independently, and so he required help from his father. His father was not very comfortable in using the layout editor so this hindered the progress of user 2. The evaluator was able to resolve the issues but this was after the last session during the trial.

There was a problem with the switch input as it was not operating as it should. The user was unable to use the email software since the last interview due to scanning problems.

7.2.2.6 Final User Interview

User 2 liked using both the browser and the email software but found it very difficult to select buttons using his switch which may have reduced his satisfaction with the software. Overall the user found the software very difficult to use and due to this he did not feel that he was able to use the Internet or email more independently with the WWAAC software.

User 2 would be very unhappy to use the software again and commented that he only used it to please his family. He did prefer the colour buttons compared to the older buttons used in the Beta evaluation phase.

7.2.2.7 Facilitator Comments

The user was not able to work independently; he needed help from his father who did not have facilitator capabilities. User 2 had a very low, one function scanning capacity which was detrimental to his use of the WWAAC software. Even though he has good cognitive abilities, his severe motor disability is a barrier for his use of any software.

The user would be able to remember how to use the software from day to day.

7.2.3 NL User 3

7.2.3.1 User Profile

User 3 is a 25 year old female with Quadriplegia from birth. She has normal vision, hearing and oculo-motor abilities. She uses a headmouse and requires support for

computer access. She has good receptive language and cognitive abilities and her literacy is of a limited level (basic vocabulary of a few hundred word and some basic spelling skills). She uses Bliss symbols.

7.2.3.2 Interests

User 3 is interested in many things including famous women, news, cabaret and animals.

7.2.3.3 Previous Internet Experience

User 3 has heard of the Internet and Email and uses the Internet about once a week with help. She uses the Internet for entertainment and hobbies. User 3 does not use email but has watched other people use it and she would like to use email to contact friends and family. During the longitudinal trial she will be using the Internet from home.

7.2.3.4 Fortnightly User Interview 1

User 3 has used the browser very often, more than 5 times a week to get information on cabaret, youth journal, weather, women pages and much more. The problems she encountered were related to a bug in the browser which did not allow multi function buttons (i.e. speech) to be moved. She also found many websites to be too complex and cluttered, frame navigation did not work on all sites. User 3 used the following functions in the browser:

- Reading text with speech synthesizer
- Using links
- Favourites page
- Going to new sites

User 3 had help from her carers to enter information online. She thinks that the Internet could be improved in general if web developers designed web pages with less able users in mind. She was very impressed with the browser as she was completely dependent before and the WWAAC software increased her level of independence.

User 3 sent more than 5 emails a week to friends, family and neighbours. She also received many replies from them. She found that sometimes the software would not send to the correct address or not send at all. This may be due to the software not selecting the address when the ‘new’ button is pressed. The following functionality was used by user 3, any problems have been outlined:

- Reading message from the inbox
- Using addressbook
- Composing and sending new emails
- Viewing message in sent mailbox
- Sending and receiving using the exchange button – This did not always work, maybe a problem with the server.

It was not possible to open attachments sent to the user and mail addresses without photos are not shown. User 3 received junk email once. User 3 is still very enthusiastic about the new possibilities given to her by the WWAAC software and is very happy to continue using the Browser and email software.

7.2.3.5 Fortnightly User Interview 2

User 3 used the browser between 1 and 5 times a week, she used it to obtain weather forecasts. Her usage has reduced since the evaluator's last visit. She has used the same functionality as previously reported and has not had any major problems with the browser. User 3 has found the symbol support site helpful but it could be improved if it was possible for the browser to read the whole sentence rather than word by word. She particularly likes the Bliss symbols with the text as well as the news topics. User 3 has found that some sites are not as accessible as others. In addition to this she has visited all the sites she wanted to and has run out of ideas of where to go. Her mother is helping her to find new sites.

Since the last interview user 3 has had many problems with the email software. She still has used the email software frequently and has sent many emails each week as well as receiving many replies. She has used the email to arrange social meetings with friends and contacting family. She has used all the functionality as reported in her first interview but has had more problems. The email program crashed after user 3 received an email which had a large attachment (in excess of 2 MB). In addition to this the photos saved in the addressbook also caused a similar problem and had to be deleted. This was reported to the technical team in order to be resolved. User 3 made the following suggestions in order to improve the software:

- User 3 misses having a reply button
- She is confused by the send and exchange buttons as they are too similar
- She would like to have the option of having just text instead of photos in the addressbook
- She would like to have a stop button for speech which is available in the browser but not in the email

Even with the technical problems user 3 admits that she would not be able to do without the email software. She prefers the email software compared to the browser and this may be due to the interactive nature of the email and the user not having a desire to visit any new sites. The user is happy to continue using both the email and the browser software.

7.2.3.6 Fortnightly User Interview 3

User 3 has not been using the browser as much due to the weather being good and she has been outdoors a lot, she has used the browser about once a week. She has used the same functionality as reported in her first interview and has had no problems with the software. She would like to be able to use words from her own vocabulary to enter into the search engines.

User 3 has still been sending more than 5 emails a week and receiving about four emails a day in return. She has been able to make new friends and arrange social meetings. She has used all the functionality as reported previously but she has had problems with the photos in the addressbook which have caused the software to crash on occasions. The problems have been resolved by the evaluator and the technical team. She has received one junk email.

User 3 would like a button in the browser and email that allows the user to change from one to another. The user is still happy to continue to use the browser and email software.

7.2.3.7 Final User Interview

User 3 liked using the browser and email software and generally found the software very easy to use. She feels that she is more independent in accessing the Internet and email with the WWAAC software compared to before. She would like to continue using the WWAAC software and believes that the software has made the following possible for her:

- Using software has increased self confidence
- She feels that she can express her feelings more with words
- She has improved her contact with the outside world and can make contact independently
- She has gained more confidence in her achievements which have resulted in a more confident person, things like her wheelchair driving have also improved.
- She looks and feels better

7.2.3.8 Facilitator Comments

Users 3's mother fulfilled the role of her facilitator. She is very positive about the new possibilities that this software has had for her daughter. She believes the WWAAC software has made her daughter more independent and has improved her level of performance with the Internet and email. She has observed user 3 and has seen her use the software with ease and has found her to remember how to use the software from day to day.

7.2.4 NL User 4

7.2.4.1 User Profile

User 4 is a 11 year old male with Quadriplegia from birth with normal vision, hearing and oculo-motor abilities. He is a direct access user and requires support some of the time to access the computer. He has got good receptive language and cognitive abilities and his literacy is of a limited level (basic vocabulary of a few hundred words and some basic spelling skills). He uses PCS and Bliss symbols.

7.2.4.2 WWAAC Software Used

User 4 used both the WWAAC browser and email software during the trial.

7.2.4.3 Interests

User 4 is interested in educational websites for children, games and general entertainment for children.

7.2.4.4 Internet Experience

User 4 has heard of the Internet and email and uses the Internet independently frequently (more than 5 times a week) mainly for entertainment. He uses email between 1 and 5 times a week, independently, to email his family. He will be using his home computer to take part in the longitudinal trial.

7.2.4.5 Fortnightly User Interview 1

User 4 used the email about once a week to get information about his youth journal. He used the following functionality and he did not report any problems with the browser:

- Reading text with speech synthesizer
- Using links
- Favourites page

User 4 did not have any suggestions or comments about the browser.

User 4 sent between 1 and 5 emails per week and received a similar number in return. He mainly sent emails to the evaluator. His mother, who was acting as his facilitator, was not able to give him as much help with the email as the evaluator had hoped for. User 4 had used the following functions and did not report any problems:

- Reading message from the inbox
- Using addressbook
- Composing and sending new emails
- Viewing message in sent mailbox
- Sending and receiving using the exchange button

User 4 did not have any suggestions for the email software.

7.2.4.6 Final User Interview

User 4 liked both the browser and the email software and he found the software very easy to use. He felt that he was able to access the Internet more independently with the WWAAC software compared to before. He is very happy to continue to use the WWAAC software.

7.2.4.7 Evaluator Comments

User 4 has the ability to use the Internet and email but the support he gets from his mother is not enough and with greater support he would be a very competent user of the software. User 4's vocabulary was not sufficient to write email but he prefers to explore the Internet and play games.

7.2.5 NL User 5

7.2.5.1 User Profile

User 5 is a 17 year old female with Tetraplegia and Epilepsy from birth. She has normal vision, hearing and oculo-motor abilities. She uses a trackerball as an input device for the computer and accesses the computer independently. She has reasonable receptive language and cognitive abilities and her literacy is of a limited level (basic vocabulary of a few hundred words and some basic spelling skills). The symbol set used by user 5 is Bliss symbols.

7.2.5.2 WWAAC Software Used

User 5 used both the WWAAC browser and email software during the trial.

7.2.5.3 Interests

User 5 is interested in schoolwork, horses and girly topics.

7.2.5.4 Previous Internet Experience

User 5 has heard of the Internet, the world wide web and email and uses the Internet about once a week with help. She uses the Internet for entertainment, schoolwork and hobbies. User 5 uses the email about once a week with help to email family. During the trial she will be using the Internet at home.

7.2.5.5 Fortnightly User Interview 1

User 5 has been severely ill. This has caused her to be tired and she has only been able to use the browser software with the help of her mother. She has used the browser between 1 and 5 times a week to do her homework and research for her essay. She has used the following functionality and any problems have been outlined:

- Reading text with speech synthesizer – Problems with speech output from links
- Using links - Problems with speech output from links
- Favourites page
- Going to new sites

The problem was due to confusion from user 5's mother as she thought that it was possible for the browser to read out a link by directly clicking on it. This was resolved by some additional guidance from the evaluator.

7.2.5.6 Fortnightly User Interview 2

Due to illness and vacation user 5 has only been able to use the email software since the evaluators last visit. She sent more than 5 emails this week and received a similar number in return. She emailed her friends and requested them to send photos to her so that she could add them to her addressbook. When she did receive these she could not add them to the addressbook. She used the following functionality:

- Reading message from the inbox
- Using addressbook
- Composing and sending new emails
- Viewing message in sent mailbox
- Sending and receiving using the exchange button

Apart from the addressbook she did not have any other problems with the email software.

User 5 has suggested the following points to improve the email software:

- Be able to send and receive attachments
- Indicate which emails have been read
- The scroll bar in the inbox and outbox is not clear, please improve
- The attachment (DM file) which is sent to recipient is confusing
- The speech buttons are different from the browser buttons, this is confusing

User 5 was happy to continue with using the email software.

7.2.5.7 Final User Interview

User 5 liked using both the browser and email software and thought that the software was easy to use. She would like to able to use her Bliss vocabulary and word prediction. User 5 was already somewhat independent and feels that the WWAAC software has made her a bit more independent in accessing the Internet and email. She uses Doc Reader which she is very familiar with and is reluctant to change to completely new software. Nevertheless she does miss having bliss symbols in Doc Reader. She would like to use the software again but will not miss it too much if she does not.

7.2.5.8 Evaluator Comments

User 5 uses Doc Reader which she cannot operate totally independently and requires a lot of help from her mother. The WWAAC email software is very good for her but she is already familiar with Doc Reader now and would not want to risk changing, as she is afraid to lose what she has already got.

7.2.5.9 Facilitator Comments

The facilitator thinks that the WWAAC software has increased the ability of the user to perform tasks with less assistance. She also believes that the software has sufficient functionality to support both the user and the facilitator. The level of performance of the user with the Internet is the same (compared to Document Reader) but has improved for email. The software can be learned quickly and easily and the user can recall how to use the software easily. User 5 is more motivated to use the email and this has had an impact on the quality of the users interaction with Internet services.

7.3 Users in Sweden

There were 3 users involved in longitudinal phase from Sweden. All of these users had taken part in the Beta evaluation trials. Two of the users used both the WWAAC browser and WWAAC email software, one user used the browser software only.

7.3.1 SE User 1

7.3.1.1 User Profile

User 1 was a 35 year old male user with Cerebral Palsy from birth. He had normal vision and hearing, used a trackerball to aid his computer access and accessed his computer independently. He has good receptive language and cognitive abilities and his literacy is of a pre literate level (limited use of symbols and pictures only). He uses Bliss symbols occasionally.

7.3.1.2 WWAAC Software Used

User 1 used both the WWAAC browser and email software during the trial. He also made use of the WSW, and this is reported in Section 8.

7.3.1.3 Previous Internet Experience

User 1 uses his home computer to access the Internet and uses the Internet between 1 and 5 times a week, with help, mainly for entertainment purposes. He uses email about once a week, with help (he dictates while somebody writes the text), to get information about things he is interested in (i.e. buying a car). During the trial user 1 will use his home computer to access the Internet.

7.3.1.4 Fortnightly User Interview 1

User 1 used the browser a few times mainly to get familiar with it but he had not used it enough to be able to comment on its functionality. He found the symbol support site helpful.

User 1 sent a few emails using the WWAAC software and received a similar number in return. He received some junk email. User 1 found the symbol support within the WWAAC software helpful but the was unable to comment specifically on the functionality of the email software as he did not use the email very frequently. User 1 was happy to continue using the WWAAC browser and email software.

7.3.1.5 Fortnightly User Interview 2

User 1 used the browser about once a week but had difficulty in remembering exactly which sites he had visited. He was again unable to report any specific problems as he did not use the browser frequently enough to do so.

User 1 used the email software to send one email a week to the WWAAC evaluators and received 1 – 5 emails per week. He used the following functionality from the email software:

- Using addressbook
- Composing and sending new emails
- Viewing message in sent mailbox
- Sending and receiving using the exchange button

User 1 did receive some junk mail. He did not make any suggestions or comments about the software but was happy to continue using both the email and browser software.

7.3.1.6 Final User Interview

User 1 like using the WWAAC browser and email software. He found the software fairly easy to use but made the following suggestions to improve the software:

- The email software should read the functions of the buttons when using right mouse click (as it does in the browser)
- More clear icons on the buttons
- When using email for writing some Bliss symbols are difficult to see, these should be made clearer

User 1 did find the symbol support helpful but would like the speech support to be better. User 1 does not feel that the WWAAC software has increased his independence in accessing the Internet compared to before and this was partly due to user 1 being able to access computers independently. User 1 was very happy to use the software again.

7.3.1.7 Facilitator Interview

There have been problems with viruses and junk emails on user 1's computer and this has adversely affected user 1's use of the WWAAC software. The facilitator did not have as much involvement as he would have liked but felt that user 1 had been more independent than before and is managing well.

7.3.2 SE User 2

7.3.2.1 User Profile

User 2 is a 19 year old male with Cerebral Palsy since birth. He had normal vision, hearing and oculo-motor abilities. His input device for the computer was a joystick and he accessed the computer independently. He had good receptive and cognitive abilities and his literacy was of a preliterate level (limited use of symbols and pictures only). The symbol set he used was Bliss.

7.3.2.2 WWAAC Software Used

User 2 used the WWAAC browser and email software during the trial. User 2 also made use of the WSW software and these findings are reported in Section 8.

7.3.2.3 Previous Internet Experience

User 2 only had occasional use of the Internet, with help, and used it to find information about his hobbies. He used email software more than 5 times a week independently to send emails to his family. During the trials User 2 made use of the Internet at home.

7.3.2.4 Fortnightly User Interview 1

User 2 used the browser between 1 and 5 times a week. He had used most of the functionality within the browser and the only problems he had were the Internet connection being too slow and the browser unable to identify links in a particular site. His overall impression of the browser was from good to very good.

User 2 sent a few emails using the WWAAC software and received a similar number. He used the following functionality within the email and any problems encountered have been outlined:

- Reading message from the inbox – User 2 was unable to open attachments
- Using addressbook – It was not possible to reply to an email if the sender was not in the addressbook
- Composing and sending new emails
- Sending and receiving using the exchange button

User 2 was unable to copy other people into his emails as he can with other software. User 2 was happy to continue using the browser and email software as long as they work.

7.3.2.5 Fortnightly User Interview 2

User 2 used the browser a few times since his last interview. He used the browser to look for new sites and used the following functionality within the browser:

- Reading text with speech synthesizer – Problems with speech output from links
- Using links - Problems with speech output from links
- Favourites page
- Entering information online – With help

User 2 suggested that the function of the buttons should be read out when moving the mouse pointer over them.

User 2 did not send any emails since the last visit.

7.3.2.6 Fortnightly User Interview 3

User 2 had used the browser a few times since the last interview. He used the same functionality as reported previously and did not have any problems or suggestions to report.

User 2 did not use the email since his last visit.

7.3.2.7 Fortnightly User Interview 4

User 2 had used the browser a few times since the last interview. He used the same functionality as reported previously and did not have any problems or suggestions to report. User 2 wanted the evaluators to show his grandfather how to change the layout so that he could help him when the evaluators have left.

User 2 did not use the email since his last visit as he had difficulty getting into the program.

7.3.3 SE User 3

7.3.3.1 User Profile

User 3 was a 21 year old male with Cerebral Palsy since birth. He had normal vision, hearing and oculo-motor abilities. He used two switches to access the computer and required support. He had good receptive language and cognitive abilities and his literacy was of a limited level (basic vocabulary of a few hundred words and some basic spelling skills). User 3 used Bliss symbols.

7.3.3.2 WWAAC Software Used

User 3 used the WWAAC browser software during the trial.

7.3.3.3 Previous Internet Experience

User 3 had heard of the Internet and email. He did not currently use the Internet but would like to use it for entertainment and schoolwork. He would need help to access the Internet.

7.3.3.4 Fortnightly Interview 1

User 3 used the browser about once a week to search for and listen to music. He used the following functionality:

- Reading text with speech synthesizer – Problems with speech output from links
- Using links - Problems with speech output from links
- Favourites page
- Entering information online
- Going to new sites

User 3 would like the browser to allow the user to change the volume on the sites because he went to music sites and wanted to be able to change the volume of the music on his own.

7.4 Overall Feelings from Users

Out of 9 of the users involved in the longitudinal trials had a final interview which recorded the users' feelings towards the software. 8 of these users used the browser software of which 5 used the email software as well. 1 user only used the email software.

All of the users liked using the WWAAC software, 3 users (33%) felt that the software was very easy to use, 3 users felt that the software was easy to use (33%), 1 user felt the software was OK to use (11%) and 1 user thought that the software was very difficult to use (11%). Therefore the majority (66%) found the software easy to use. There was only one user who found it difficult to use and this was due to the user experiencing many technical problems particularly with the scanning which did not allow him to fully experience the benefits of the Internet. In addition to this the user had not had much experience in using the Internet prior to the WWAAC trials and this meant that he did not have anything to compare to the WWAAC software.

Out of the 9 users, 6 users (67%) felt that they had been able to use the Internet and / or email more independently with the WWAAC software compared to before. 1 of the users said that there was no difference as they were already able to use the Internet independently. 2 users did not feel an increased independence in accessing the Internet. These users had experienced technical problems with the WWAAC software that hindered their use of it and may have contributed to the negative impact of the software.

The majority of users were happy to use the WWAAC software again (89%), 6 of the users (67%) were very happy to use the WWAAC software again, 2 users (22%) were happy. 1 user was very unhappy to use the software again. This user had faced many technical problems and in addition to this did not participate for his own

interests but in order to please his family. The lack of enthusiasm coupled with the technical problems have contributed to the negative feelings of the user.

7.5 Conclusions

Overall the WWAAC software did have a positive impact on the majority of users and any negative experiences of the software were primarily due to technical problems encountered by the users. Many of these technical problems were able to be resolved but the software would need to be free from such problems before being commercialized.

The experience of the users with the browser was somewhat affected by external factors, such as many websites being designed poorly which made them inaccessible by the browser. These inherent barriers of website design will always remain to a degree but can and should be reduced by educating the web developers and designers with guidelines and standards for accessible design for different user populations.

Overall the facilitators were impressed with the WWAAC software and felt that the software was providing sufficient functionality for the users. There are many factors that affect the experience an AAC user will have with the WWAAC software:

- Role of the user – The enthusiasm and motivation of the user play an important part in user experience, the greater the better. The ability of the users is equally important as the advanced users would find some features of the WWAAC software too simple and would miss the more advanced functionality found in some of the mainstream software whereas the novice users would rely a great deal on their support.

- Role of the facilitator – Regular committed support is vital to assure that the user is trained up in using the software as well as maintaining the aspects of the software that most users will have difficulty in using (e.g. layout editor, settings configuration).

- Role of the technical support – Providing training for the facilitators in using the software and the different features within that software. Technical support would need to be easily accessible to the facilitators in case they require technical assistance. An easy to use manual could help the facilitators but could not replace on-hand advice from technical support.

- Role of the software – The software has to be robust and free from any major bugs. It should have sufficient functionality and include many of the simple and useful features from the mainstream software. The software should be easy to use and intuitive and it should be possible to tailor the software to the users' preferences easily. It should be compatible with existing hardware, input devices and the infrastructure (e.g. existing networks etc.) to minimize the effort required to install the software.

- Role of the Internet – For the WWAAC browser to be compatible with web pages the designers and developers of web pages need to consider the less

able user population. They need to make pages that are compatible with screen readers and avoid unnecessary complexity. If the page is complex then an alternative simpler page should be provided ideally. The web pages need to follow accessibility and usability guidelines.

The longitudinal trials have shown that the WWAAC software is addressing issues relevant to people who use AAC. It has demonstrated that when accompanied by support and enthusiasm, the WWAAC software can benefit users and increase their level of independence with the Internet and Email services.

8 LONGITUDINAL CASE STUDIES OF BROWSER AND EMAIL INCLUDING WSW

8.1 Introduction

This Section summarises the results of the longitudinal phase in which the WWAAC Supportive Writing (WSW) was evaluated through a series of end user trials. Two end users participated in six trials at six different sessions. The trial sessions took place in the users' homes approximately every fortnight, from March through May 2004.

The detailed methodology for the longitudinal trials can be found in Section 9 within Deliverable 13 'Final user interface report: The evaluation plan'. It was decided that an individual case study approach is particularly relevant for this evaluation process, and so the two users will be discussed individually.

8.2 The plan for each session

In order to investigate whether the WSW would make email and text composition easier for the user we needed to compare usage and output from writing both with and without the WSW. Thus, to keep all other conditions equal the test texts should be written with the WSW integrated in the WEM and the comparison texts should be written with the WEM containing their ordinary symbol charts without the grammatical support. Both conditions could then be automatically logged.

8.3 The current status of the software

The longitudinal evaluation was planned to be the final evaluation in the project, and as such, by synthesising feedback from pilot evaluations and user and expert consultations regarding the functionality of the software, evaluate the usage and efficacy of the software with end users.

During this period the software never reached the point where it was robust and reliable enough to run the sort of longitudinal evaluation envisaged in Deliverable 13. Two major issues prevented the users from really being able to explore the basic purpose:

The first was that the WSW and the WEM were not integrated into a reliable entity, which meant the users could not use the texts from the exercises to send real mail. The writing sessions could therefore never be anything other than exercises or simulated tasks. This condition was not very stimulating and did not motivate the users to use the WSW on their own.

The second issue was the lack of a well functioning "undo" and "backspace" button. While this may initially seem like a minor flaw, in reality it caused the users extensive confusion and frustration. A backspace button would have enabled users to explore, play around, and look for a target symbol. Instead, what happened was that every time the user wanted to look at a specific chart for a specific symbol and then used the backspace, he was taken to a different chart rather than the previous one. On

many occasions it was easier to restart the sentence than continue from the wrong chart. When this happened at the last word in a sentence, it was really frustrating and made the user give up.

8.4 Alternative Methodology

Since we were not able to carry out the trials in the way that was planned in Section 9 of Deliverable 13, we decided to make a set of simple sentences as exercises. The purpose was to examine whether the users could find the target symbols, and if, by training with the repeated structures, realize the advantage of the WSW. The sentences have now been translated from Swedish to English and are in Appendix13.

Since the fortnightly interview with the user should be based on actions between evaluation sessions, and neither of the two users had been able to use the WSW in between, there are no interview results to report.

8.5 Users

Two users, User 1 and User 2, participated in the longitudinal evaluation. These two users also participated in the evaluation of the WWB and WEM, presented in Section 7.3.1 (User 1) and 7.3.2 (User 2), and in the earlier pilot investigations of the linguistic module (see Section 5). More information about the users can be read in these sections, and their user profiles are summarised in Appendix 6.

8.5.1 User 1

8.5.1.1 Notes from sessions

Session 1:
Most of the session was spent installing the WSW on user 1's computer. The WSW behaved differently compared to the trials carried out on our own computers earlier and it became apparent that the program was not sufficiently reliable and robust for the users to evaluate. The version used had the five basic sentence types prompted by one sentence initial (NP, VP question, VP Imperative, question word, Adverbial P), with one of them (Adv P) represented by three cases (future, present, and past). This set of sentence types was too intricate, complex, and confusing for User 1. The advantage of the WSW may not have been realized due to these circumstances and the evaluation tasks became too difficult to be carried out. Thus we were not able to collect the evaluation data in the form of text and logging material as planned.

Tasks to be carried out by User 1 before the next session:
- To write a mail to any of the evaluators during the coming two weeks.
- To write a diary together with the personal assistant since he finds it difficult to remember what has happened earlier during the week. This diary has to be the basis for the writing task topic the coming evaluation session.

Measures to be taken by the evaluation team before the next session:
- Send sentences for training

- Take out some of the sentence types to minimise the set of sentences (the Adv P initials)
- Prepare a script with simple structures and many repetitive examples
- Change some of the labels and glosses on the chart
- Amend some of the grammatical functions

Session 2:
This session, like the previous session, was a session of exploration and trying out the software, rather than collecting a set of robust data. The WEM had disappeared since the previous session and had to be reinstalled, which took most of the session. The WSW had been too complicated to use independently and there had been no time for User 1 to train together with the assistant. The WSW worked and the advantage and purpose with the program possibly became slightly clearer to User 1.

Session 3
During this session both WEM and WSW functioned and we were able to start the modified evaluation procedures as planned. Script sentences were written without SW and a mail with WEM but without the WSW was written and successfully sent. Script sentences were written with the WSW but then there was no time to write and send a mail written in the "with WSW" condition. Therefore, a mail was written and sent by the evaluator to User 1 and his assistant the following week with instructions about how to produce a mail with WSW and send it back to the evaluation team. The mail contained instructions about how to write with WSW and what the task consisted of. It also contained information about the status of the current WSW and why there were so few sentence types. Further, there were instructions about how to find the log files and how to send them. For private reasons there was no answer to this mail.

Session 4:
User 1has probably had a virus on his home computer and visited us at DART. He has been ill and not able to do any practising.

8.5.1.2 Test results

Texts - Session 2:
A mail was sent to one of the evaluators. The text contained five content items, all of them written by the help of pre-made phrases:

"How are you?" ". (Hur står det till?)
"We'll meet soon!" (Vi ses snart!)
"Welcome!" (Välkommen!)
"Many hugs," (Många kramar)
"Name".

Texts - Session 3
During the session a mail was sent to one of the evaluators. The message was constructed with the WEM, but without the WSW.

Target message:

Hi T, I have prepared (think) to say what I have done this week.
I have gone to the "name" Blissymbol group.

Actual message translated from Swedish:

Hi t,
i have think say i have do week
i have go “name” blissymbol group Tuesday

Actual message:

hej t
jag har tänka säga jag har göra i vecka
jag har åka D blissymbol grupp tisdag)

Texts - Session 4:

User 1writes two messages with the WEM this session; one without the WSW and one with the WSW. Since the WEM and the WSW are not successfully integrated yet the task was to simulate a mail. The topic for the text without the WSW was to tell about what he had been doing during the last week and the topic for the mail with the WSW was to write about his plans for the coming week. He needed the feedback voice on the buttons, since he does not read.

The first task was to write a text without WSW:

Hi (Hej)
“How are you” (pre-made phrase) “with you” (you not inflected). (Hur står det till? (färdig fras) med dig (du)?)
“I am ill in ear week.” (Jag är sjuk I öra I vecka.) (enters full stop at prompting)
“Now I watch (uninflected) hockey” (“Nu jag se på ishockey”)

The next task was to write a text with the WSW:

Target sentence:

I want to watch hockey. (Jag vill se på hockey.)

Actual sentence:

I want to watch the sports (Jag vill se på sporten.), (the symbol for hockey is not there.)

Target sentence:

I will watch the sports next weekend.

Actual sentence:

I will watch the sports. (Jag ska se på sporten.) [Automatic full stop after “sports” before he had the possibility to add ”next weekend”.]

For simplicity reasons the adverbial phrases were taken out but User 1 wanted them back again before the next session. He was then prompted to restart with Adverbial phrase and he could simulate the phrase “Next weekend I will watch the sports.

8.5.1.3 Log files

Session 4:
The log file shows that for the text “I want to watch the sports” (Jag vill se på sporten.). “I will watch the sports.” (Jag ska se på sporten.). 33 keyboard events were demanded (”clicks”), 12 for the first sentence and 21 for the second. He used “back space” three times and added new words. After “I will watch” in the second sentence, he had to restart the sentence and type the deleted words once again. For the two sentences 18 keystrokes had been necessary. User 1 made another 15 keystrokes due to system inconsistencies and the lack of a well functioning “undo” and “back space” button.

8.5.2 User 2

8.5.2.1 Notes from sessions

Session 1:
Just like with User 1, most of the session was spent on installing the WSW on User 2’s computer. The WSW behaved differently compared to the trials carried out on our own computers earlier and it became apparent that the program was not sufficiently reliable and robust for the users to evaluate. The version used had the five basic sentence types prompted by one sentence initial (NP, VP question, VP Imperative, question word, Adverbial P), with one of them (Adv P) represented by three cases (future, present, and past). The version used had five basic sentence types prompted by one sentence initial (NP, VP question, VP Imperative, question word, Adverbial P), with one of them (Adv P) represented by three cases (future, present, and past).

This set of sentence types was too intricate, complex, and confusing to User 2. The advantage of the WSW may not have been realized due to these circumstances and the evaluation tasks were difficult to be carried out and we were not able to collect the evaluation data in form of text and logging material as planned. Even for User 2 it was necessary to construct simple sentences for training, i.e., a simple structure with many examples.

Session 2:
Due to technical problems with the WSW, the planned procedure for the evaluation session could not be followed. In order to improve the grammar in one structure case, a rule file was exchanged. As a result of that action, the WSW crashed. It took the most part of the remaining session to repair the error. Added to the problems with WSW, the WEM had disappeared since the previous session. Instructions were given to User 2 and his facilitator (relative) how to proceed with the exercises.

Session 3:
Evaluation tasks were carried out, however, to a limited extent.

Session 4:
Since User 2 had not been able to work independently with the WSW, the fortnightly interview was not adequate. User 2 has not been able to work with the WEM since last session as it had disappeared and so had the speech synthesis. This session’s

tasks were carried out without speech synthesis. The two evaluators present “acted” the speech synthesis.

8.5.2.2 Test results

Texts - Session 3:
Task sentences written with WSW:

I am happy. (jag är glad .)
I am angry. (jag är arg .)
Woman I is happy. (kvinna i är glad .)
I think. Mother comes. (jag tänka .)(mamma komma .)

Task sentences written without WSW:
Prompt: ”Tell us about last Wednesday!”

I was on Wednesday sport. (jag var på onsdag sport .)
We go (uninflected) by bus. (vi åka buss.)
I had drawing yesterday. (jag hade bild igår.)

Texts - Session 4:
Writing without WSW:
Prompt: ”Tell us about last Wednesday!”

“I and grandpa were o - (back space), writes “to” with letters - to countryside meeting.” (”Jag och morfar var (å) –back space, writes ”på” with letters - landsbygd samling.”) [Full stop on prompting.]
“I go home to (makes a spelling mistake and deletes) grandma and grandpa”. (”Jag åka hem till morboro (suddar) mormor och morfar.”) [Full stop on prompting.]
[He enters carriage return on his own initiative. He is reminded to use the preset phrases.]
“Hugs” (Kramar)
“Name” (Name)

Writing with the WSW with the evaluators reading the glosses instead of the speech synthesis:

“The woman (wants to write an indicating letter but cannot switch to letter mode within the WSW) will go on with the Internet.” (“Kvinnan ska fortsätta med Internet”)
”I (will) go to the man.” (“Jag ska till mannen.”)
“I will go (drive) to school.” (“Jag ska åka (köra) till skolan.”)

Note, it is not totally clear whether the second sentence was planned or a result of selecting the offered suggestions.

8.5.2.3 Log files

Session 4:
The log file shows that for the text “The woman will go on with the Internet.” (“Kvinnan ska fortsätta med Internet”),”I (will) go to the man.” (“Jag ska till mannen.”), and “I will drive to school.” (“Jag ska åka (köra) till skolan.”) 32 keyboard events were demanded (”clicks”), 11 for the first sentence, 8 for the second, and 14 for the third.

After “I will” in the third sentence, he had to restart the sentence and type the deleted words once again. For the three sentences 27 keystrokes had been necessary. User 2 made another 5 keystrokes due to typing mistakes.

8.6 Concluding remarks on the longitudinal evaluation of the WSW

Two factors seem to contribute to the lack of valid conclusions to the question, “can symbol users produce grammatically better formed sentences with the assistance of the WSW than otherwise?”:

One factor has to do with the actual software. The WSW was not sufficiently reliable and robust for the users to use as a tool. Too little user feedback had been given in advance for further development and appropriate changes. This missing functionality may deteriorate the total impression of the software since it caused both confusion and frustration and the basic purpose with the WSW may have been obscured by these circumstances. Further, the users were never able to carry out any “real life” actions, such as sending and receiving mail for “real” reasons. They may have been less motivated when the tasks merely were simulated tasks rather than exercises.

The second issue relates to time. There was not sufficient time for the users to learn, understand and train with the program. This meant they were never able to feel progress or success, which is necessary to continue the endeavour.

In order to come to either positive or negative conclusions regarding the value of WSW further longitudinal evaluations are necessary with a robust version of the integrated WSW and WEM.

9 USER CONSULTATIONS

9.1 Introduction

During the earlier trials, the WWB was perceived to be better than other Web browsers for the primary target population due to its flexibility. In particular, using the Layout Editor, it is possible to make the most important functions available to the user, with the potential of adding further buttons later on. This flexibility may well be applicable to a broader range of groups who may benefit from easier access to the Internet, such as people with learning disabilities who use symbols as aids to literacy, people with aphasia, and the elderly. The final stages of the project aimed to explore these possibilities.

In parallel with the longitudinal case studies, further consultations took place with other user groups in the United Kingdom, the Netherlands, Finland and Spain, in order for further expert and user feedback to be obtained. This was useful to supplement information obtained from the longitudinal studies and to also identify other markets for the browsing and e-mail software. The groups included in this phase included:

- People with aphasia
- Older users
- People with learning disabilities, including people with dyslexia
- Further professionals

These investigations were more informal than the alpha or beta trials, and collected qualitative information from different user groups to assess to what extent the software meets their needs. Separate questionnaires were developed for users and professionals, covering the browser and the email, with or without WSW, and these can be found in Appendix 8 of Deliverable 13, Final User Interface Report. Evaluators used these questions as a guide only, and questions were adapted, where appropriate, to the specific needs of each user group. For this reason, the reporting of the results below is not in a consistent format.

9.2 Barcelona Workshop

The first activity during the User Consultations phase of the project was two workshops in Barcelona. The first workshop was with 4 users, and the second was with a group of professionals. Both workshops were held at an assistive technology centre in Barcelona.

9.2.1 Workshops with Users

Key functionality of the Browser was first demonstrated, using a Favourites page set up to reflect the particular interests of each user. Specific results from each user consultation are provided below:

9.2.2 User N

This user, age 29, with CP, uses a low tech Bliss chart and SAW for computer access with 1 head switch. She attends a day centre where there is computer access, and there is a computer at home with SAW. User N has used the Internet using SAW and receives support from other people to help her understand the page. She types emails with support (typing familiar words herself), and when receiving an email, the facilitator reads this aloud. It was reported that the speech synthesiser at the Centre she attends is not very clear.

This WWB evaluation was over 2 morning sessions. Time was spent trying to identify sites of interest, as this user was not keen to visit many of the pre-selected sites. The evaluation process was quite informal. Two facilitators, who knew her well, supported User N and also gave feedback.

User N initially felt the speech support was 'okay'. She commented that it "speak a lot" and "rapid". Using the layout editor it was possible to introduce the 'faster' and 'slower' buttons. She then described the speech support as excellent. She is very motivated to improve her reading ability, and her facilitator wondered if the focus enhancer might help her to achieve this.

User N felt that the favourites page was excellent. She also felt that overall the WWB was excellent. She reported that she found it moderately easy to use. However, her facilitator commented that it was a lot to absorb in such a short period of time.

User N felt the graphics on the buttons were good; there were just too many at the current time. However, she did feel a bit confused between the graphics on the four links buttons (next link, fast next link, go to link, previous link). She was not particularly interested in having bliss symbols on the buttons, as she would still have to learn the button functions. However, she did feel that having an auditory scan might help her to achieve this. It might also be helpful to have larger writing on the buttons as she is able to recognise some words, and the font is currently quite small. However, User N felt that auditory scanning was more important than increasing the font size. User N thought the layout of the buttons was excellent (buttons were placed on the top, left side, and bottom).

User N indicated that it was very easy to select the buttons using her switch. However, she would like a button to select if a mistake has been made when scanning, i.e. to cancel the scan rather than waiting for it to go through the mistakenly selected buttons several times. When asked if she would prefer to access the browser through an alternative method such as Switch Access to Windows (SAW), she said 'no'. However, her facilitator wondered if it might in fact be better.

When searching on Google, the facilitator commented that a lot of what is initially read is not of interest. She wondered if a 'skip 5 paragraphs' function might be useful for websites that are known to have irrelevant text at the top. Note that the 'read all' feature could not be demonstrated due to an error, and so this comment was based upon experience with 'next paragraph' only.

Summary of recommendations:

- May want to further differentiate the graphics on the link buttons
- Time is required to get to know the software, and features may need to be introduced gradually over a period of time
- It would be useful to be able to increase the size of the font on individual buttons
- Auditory scanning may assist people in learning the button functions
- A 'cancel' or 'made a mistake' button might be useful for some single switch users
- Some form of skip text button might be useful for known web pages, e.g. 'skip 5 paragraphs'.

9.2.3 User I

This user, age 26, with Cerebral Palsy, uses a Lighttalker and SAW, with 1 head switch and has no Internet experience. The WWB evaluation was over 2 morning sessions. Usage of the software was quite informal, but led to a number of modifications to the interface as the evaluation progressed. The user and facilitator felt that the icons looked similar to PCS, and did not make any suggestions for changing them. A simple configuration of buttons was used, and the Layout Editor proved to be invaluable in making modifications quickly as and when the user or facilitator suggested them.

Recommendations or comments for future improvements:

- The highlight for the paragraph focus was too thin and was widened (it was suggested that the range of adjustments should allow for an even thicker line).
- Provide a button to continue scanning in only one particular group.
- Necessity to scroll through the Favourites page did not enable user to know how many rows of icons were available.
- If user wishes to stay within 2 buttons (e.g. moving between links), perhaps a button could enable this. It was important to be able to repeat 'next link' without continuing to scan.
- When starting to scan a row, the scan should remain on the first button for a longer period so that the user doesn't miss it and select the second button by mistake. This could be done by adding a 'dummy' button, or by setting a delay.

- When reading text, it would be better to stay on the 'Read paragraph' button until it finished reading, and then start scanning again. (The configuration was then changed to 'Read all', which was more suitable for this user.)

- It was suggested that there be a 'first link' button (this could perhaps work in conjunction with a 'Go to Links' button as recommended in Deliverable 12a).

9.2.4 User M

Another user consultation was conducted with a woman, aged 34, who at 16 had suffered traumatic brain injury. Now she has aphasia and is deaf, and communicators must write down what they want to say to her. She uses a mouse and a palmtop to communicate, enjoys writing emails and has been using the Internet for over 2 years.

This evaluation was over 1 session of about 2 hours. Usage of the software was quite informal, but led to a number of modifications to the interface as the evaluation progressed. The Layout Editor proved to be invaluable in making modifications quickly as and when the user or facilitator suggested them. There were no particular features of the WWAAC browser that she particularly disliked, and she especially liked the 'Zoom in' and 'Zoom out' buttons, the large size of the buttons compared to Internet Explorer, and the design of the icons in general. User M was able to do some 'free browsing'; the speed of the cursor was slowed down. At the end of the session she said that WWAAC was easier to use than her current software.

Recommendations or comments for future improvements:

- When adding a new Favourite, it was suggested that it be added to the top of the page.

- Would like to leave the cursor on 'Next link' rather than continuing to scan.

- Zoom in function needs to enlarge the text on the favourites page

- Need to be able to zoom in more than once

9.2.5 Younger user

Younger than the target users of the project, this boy, age 11 with Cerebral Palsy, was experienced in accessing his communication aid via a single switch. His main interest was football, but unfortunately this caused some problems as every football site visited proved to be inaccessible. We then tried a Simpson's site, but it was not very interesting to him. He lost interest, the session was terminated, and no interview was conducted.

This appears at first glance to be data not worth reporting; however, it emphasises the fact that all the personalisation in the world is not going to help a user when Web sites are not designed to be accessible and usable. Therefore, it is vital that Web developers apply best practice in usability into their Web sites, as well as following Web Content Accessibility Guidelines, as proposed by W3C–WAI, and discussed in

WWAAC Deliverable 12a, Guidelines for developing an AAC-enabled World Wide Web.

9.2.6 Interview with Facilitator

Following the workshops with the 4 users, a facilitator who had been present throughout made the following comments:

- The software will be very helpful. After awhile the young woman was using it very independently. It matched what she wanted.
- It would be useful to start with a few buttons and gradually build up so people can learn over time. User I had very few buttons in the end and still found it difficult. But she was able to do new things, e.g. finding out about Alexandro Sanz.
- Football sites are very inaccessible!
- The browser should block all pop-ups.
- There should be a warning that also turns people back from inaccessible pages.

9.2.7 Professionals Workshop

This workshop, held over the course of one afternoon, was conducted with 12 professionals, including 1 software developer, 3 psychologists, 4 teachers, and 4 speech therapists (with some overlap with other professions). All but one person felt they had medium-high experience with assistive technology. With respect to experience with AAC, 6 professionals had low experience, and six had medium-high experience. All 12 professionals had medium-high familiarity with the Internet.

The workshop began with an overview of the WWAAC project, followed by a demonstration of the WWB, the WEM and the WSW, with some handson time. It ended with group and individual discussions, and time to complete individual questionnaires. The data from the completed questionnaires can be found in Appendix 14. A number of general positive comments were made, and other key points are summarised below:

- a very accessible and organised navigator even though the icons were a little difficult to understand, maybe this was because I am very used to using the traditional navigators.
- combining the options of the program with the facilities of AAC could really increase the autonomy of many people.
- a very good idea for people who have difficulties at the motor level, but I get the impression that it will require a lot of effort for people that have more cognitive damage.

- the initial learning will be complicated and depends on the user.
- if I were a user of AAC I would be delighted.
- it is very configurable and seems like it could be adapted to a wide group of users.
- it offers the ability to be themselves (with a certain level of help) to whoever can access the Internet. It can help and increase their self-esteem and motivation.
- there still exist boundaries regarding access (difficulties or problems with reading comprehension).
- Above all I found the navigator very interesting. . . . To me the email appeared very right/correct, above all because on a visual level everything was very clear and this helps the level of autonomy. . . . the grammatical construction came over a little complicated seeing that they already have to learn a system of abstract signs.

9.3 Older Users

These consultations took place in the UK with 4 older users: 1 user aged between 46-55 with no functional disability; 2 users between 66-75, both with no functional disability over and above the normal course of ageing; and 1 user who was 84 years of age with vision in only one eye. A summary of the questionnaires is provided in Appendix 15.

Their usage of the Internet (World Wide Web and email) had begun under a shared scheme, whereby training had been provided in the use of the Care-on-Line information service provided by Leicestershire Social Services. A computer was made available in the Manager's office, which the residents were able to use on a regular basis if they did not have their own. Frequency of use varied, and ranged from no recent usage since being in hospital, to 2-3 times a week, to use at home on a daily basis. All 4 persons used a mouse, and used the computer and the Internet independently. They were familiar with Internet Explorer and Outlook Express for browsing and sending emails.

The WWB software was first demonstrated to the group, and then the users worked in pairs, with a researcher supporting and observing the interactions. Figure 9.1 illustrates the layout used—note the 'Zoom in/Zoom out' buttons for older eyes, the lack of 'Next Link' and 'Select Link' buttons for literate mouse users, and the 'Stop/Reload' buttons which seemed important for regular Internet users.

On a scale of 1-5, with 1 being the most positive, all of the users gave the most positive response when asked what they thought about using the WWAAC browser to explore the Internet. All of the users also said they would want to use this software again. Some of the advantages of the WWB were felt to be the following:

- Favourites page as the home page, with images for favourite Web sites

- Very clear and simple
- Easy to see and select the large buttons
- Easy to zoom in and out.

However, compared to conventional browsers, the users felt that the WWB has lost some functionality that they find important:

- Auto-saving last few addresses visited
- Auto-complete of previous address entered again
- Editing the address in the address bar is not so easy as Internet Explorer
- History of Web sites visited
- Being able to open more than one window at a time

Fig. 9.1. Favourites Page used in consultation with elderly users

Following the workshop with the four older users, the Project Manager of the shared scheme completed the Browser questionnaire for professionals. He has a high experience in Assistive Technology and familiarity with the Internet, and his level of experience with AAC is low. On a scale of 1 to 5, with 1 being the highest rating, he gave the overall browser a score of 2, the pictures on the buttons a score of 3, and the layout editor a score of 2, although he asked for a further demonstration at a later date. He especially liked the size of the buttons but suggested that the clarity of the symbols should be improved by making the pictures more meaningful. From his limited viewing of the software, he thought it compared very well with mainstream

browsers and that the older users on the scheme might be able to use the Internet more independently than before.

9.4 People with Learning Disabilities

When using the Internet, people with learning disabilities are likely to have problems with navigation or reading and understanding the information. Special instruction is also needed to learn how to use the Internet, and a project called Drempels weg has been making progress in this area since January 2002, subsidised by the Dutch Ministry of Health, Welfare and Sports. As part of Drempels weg, a Dutch centre for communication and computer support called "@ACT" initiated the Enter project, in combination with other centres, in order to develop Internet courses for people with learning disabilities. The WWAAC user consultations were done in collaboration with this project.

The Web browser was tested by 3 men and 3 women with learning disabilities. Three persons communicated with symbols and 3 persons on a pre-symbolic level. Following a search for the favourite sites that the users would wish to visit, the browser had been specifically adapted for use by these end users, using just the following buttons: Start, or Home, Previous, Next, Scroll down, Scroll up, and Print. The speech output was set to read each paragraph at a time. (See Figure 9.2 below for an example of the Web browser, adapted to the individual preferences and needs of one of the end users).

On a one-to-one basis, the instructor first explained the functionality of the browser to the end user, and then asked the user to click on a favourite and go directly to that site. The instructor then demonstrated individual tasks and the user then followed the same operation. This was repeated until the user understood a step and could undertake that task independently. The training and evaluation session was followed by an interview with the user about the functionality and ease of use of the browser.

Fig. 9.2. Favourites Page used in consultation with people with learning disabilties

It was found that the most important adaptations for these users were with regard to:

- Speech support (ability to change the speed and speaker's voice)
- Browser window (ability to change the number and location of the navigation buttons)
- Visual focus (ability to change the colour and line breadth of the outline around the text)
- Favourites page (ability to adapt the number and location of favourite sites, and to change the image for a favourite site and the text underneath it)

The full results can be found in Appendix 16, but key points that emerged were that:

- The scroll up/down buttons were not needed, as the end users were used to using the scroll bar.
- The images on the navigation buttons were not always clear for the participants (as this study was conducted early in the user consultation phase, an earlier version of the icons was still in use)
- The speech output and the adaptations possible on the browser were found to be desirable for people using symbols, but particularly necessary for those at pre-symbolic level.
- Even though making the adaptations to the browser seemed quite easy and quick, it was recommended that a simpler method be found to add a different, more appropriate images for the favourites page, and that the frame/column should adapt to the largest image on the page. [Note this latter functionality was in place for most other user consultation activities].

9.5 Professional User with Dyslexia

People with dyslexia are discussed separately from others with learning disabilities in order to emphasise some of their specific needs. Dyslexia describes a pattern of difficulties people may experience in learning. It commonly affects memory, organisational skills and the acquisition and use of language. During the evaluation of the simulated Web browser (ISAAC Workshop, Odense, 13 August 2002), comments from a user with dyslexia suggested that the WWAAC browser could be very useful to support people with reading difficulties. Although this particular user could read, he suggested that the speech support could help him improve his reading comprehension and confidence, and also the summary was a useful feature to extract important information like a description of the page and key words. He suggested, however, that it would be helpful when reading the text if the voice could change when it reached a link.

Further investigations with another user with dyslexia provided additional food for thought. This user was an expert in educational technology for people with dyslexia and also dyslexic himself. The WWAAC browser and email software was demonstrated and the following comments were made.

9.5.1 Outline around the text

According to Beacham et al (2003), dyslexic students should be allowed to use active reading and learning strategies while performing particular tasks. Based on his research, this expert's advice for the speech output of the WWAAC browser was to remove the line around the words as they are spoken, as the outline might inhibit the ability of people with dyslexia to understand what is being read to them. The reader needs to be able to concentrate on the meaning of what he or she hears, rather than the word that he or she is seeing. What is seen and what is heard are 2 different tasks to a person with dyslexia, and therefore, the combination of the media (movement of the line around the text and the spoken word) is unhelpful and could distract the reader from the task at hand, i.e., understanding the content. Ideally, the rest of the page could be greyed out when reading a particular paragraph. In contrast, if the task were proofreading, and the task were to read word by word, then the line around the word would be acceptable in order to help focus on the individual word rather than the meaning of the full text.

The suggestion to remove the outline seems to contradict the comments made by the person with dyslexia at ISAAC using the simulated Web browser. Nevertheless, given the flexibility and configurability of the WWAAC browser, removing the outline box is possible, so this is not a serious issue with regard to the browser itself. The diverse requirements and preferences of different users again emphasises the importance of flexibility in configuring the WWAAC software. Further research is still needed, however, in order to decide the most appropriate default configurations for different user groups, while still providing flexibility for individual choice and preferences.

9.5.2 Choice of colour

Most users prefer dark print on a pale background, but users should be able to set their own choice of font style and size, as well as background and print colours (British Dyslexia Association's Dyslexia Style Guide at http://www.bda-dyslexia.org.uk/main/home/index.asp). A simple technique for providing choice of background colour was suggested. Provided by the Dyscalculia and Dyslexia Interest Group (DDIG) at Loughborough University (http://ddig.lboro.ac.uk), the cursor hovers over a background colour grid, and the user is able to visualise the preferred background colour to suit individual needs, thus enabling this colour to be chosen for the entire DDIG Web site. This is an easy tool that could have wider application through supportive Web browser software. The Layout Editor of the WWAAC browser could, for example, enable the user to see the change in background colours in a preview. Then the colour could be saved in the user's preferences.

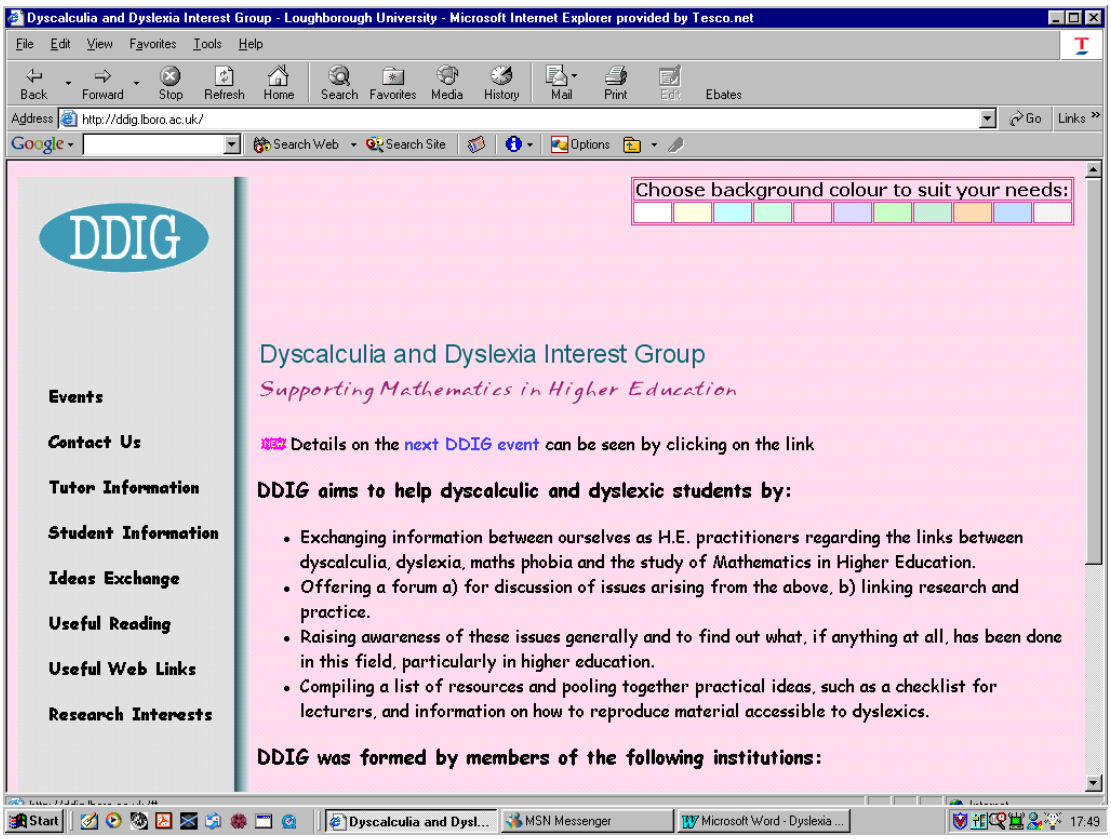
Dyscalculia and Dyslexia Interest Group - Loughborough University - Microsoft Internet Explorer provided by Tesco.net
File Edit View Favorites Tools Help
Back Forward Stop Refresh Home Search Favorites Media History Mail Print Edit Ebates
Address http://ddig.lboro.ac.uk/
Google Search Web Search Site Options
DDIG
Choose background colour to suit your needs:
Events
Contact Us
Tutor Information
Student Information
Ideas Exchange
Useful Reading
Useful Web Links
Research Interests
Dyscalculia and Dyslexia Interest Group
Supporting Mathematics in Higher Education
Details on the next DDIG event can be seen by clicking on the link
DDIG aims to help dyscalculic and dyslexic students by:
Exchanging information between ourselves as H.E. practitioners regarding the links between dyscalculia, dyslexia, maths phobia and the study of Mathematics in Higher Education.
Offering a forum a) for discussion of issues arising from the above, b) linking research and practice.
Raising awareness of these issues generally and to find out what, if anything at all, has been done in this field, particularly in higher education.
Compiling a list of resources and pooling together practical ideas, such as a checklist for lecturers, and information on how to reproduce material accessible to dyslexics.
DDIG was formed by members of the following institutions:
Start
Dyscalculia and Dysl...
MSN Messenger
Microsoft Word - Dyslexia ...
17:49

Fig. 9.3. Example of method to background colour

9.5.3 Summary Page

A summary was considered a useful feature for everyone, but especially for people with dyslexia who have difficulty trying to find relevant information and would prefer not to have to read everything.

9.5.4 Symbol support

From a learning perspective the symbol support could be useful, and possibly people with dyslexia could recall pictures more easily than text. Those with dyscalculia, however, have problems with symbols and find it difficult to relate them to what they mean, e.g., difficulties with the concept of multiplication, so symbol support is unlikely to be of benefit to them. Providing dyslexics with a symbol language to improve their writing ability could possibly be an area for further research.

With regard to the Email, this expert did not think that symbol support would be suitable for adults with dyslexia, but might be very useful for children with dyslexia as a motivation to encourage them to write more. Dyslexic children tend to shy away from reading and writing and this may encourage them.

9.5.5 Layout

The big buttons were thought to be suitable, but users would need training to get used to them. It should be possible to make the text the main emphasis on the buttons. It was also better to have just 2 rows of buttons, rather than allowing the screen to look cluttered with icons along 3 sides of the screen. It was explained that this was possible to configure (although at the moment the 2 rows could not be adjacent).

9.6 People with Aphasia

Aphasia is a communication disability that affects the language system. It may be acquired following cerebral vascular accident (stroke), head injury, or other neurological condition, causing difficulties with comprehension, reading, spoken language and/or written communication. Three workshops were conducted to enable people with aphasia and their facilitators to assess the WWAAC software. Details of each workshop are provided below, followed by a composite summary at the end of this Section.

9.6.1 Workshop 1 in NL

The first workshop took place in the Netherlands with 5 people with aphasia, 2 men and 3 women, with 2 volunteers assisting. Aged between mid 40s and 75 years of age, all but 1 user had used the Internet before this evaluation, and 1 person was an experienced Internet user (see Appendix 17 for more detail). 4 out of 5 users were able to access computers and the Internet independently, both at home and at the day care centre.

These users were able to speak, most of them could use the Internet already, and were willing to give us information about the browser, thinking of their first years of illness and other aphasia patients. Most were able to write or copy, although the texts were not always written correctly. These users were at different levels of physical and cognitive ability, able to talk, but the researcher was not always sure if they could understand everything they were saying.

Only the browser was evaluated, and not the email, as it was considered that the symbol charts would be to “childish” for them (possibly charts with text should be considered). One row of buttons was used in the browser configuration, with what

were considered the most important buttons in the configuration: (home, scroll up and down, speech, save favourite, undo favourite, renew, stop).

On a scale of 1-5 with 1 being the highest rating, 4 out of 5 end users gave the WWAAC browser an overall a rating of 1. Pictures on the buttons and their layout received ratings of 3 and higher, and each user gave the highest rating for ease in selecting the buttons (all were mouse users). One user in particular said that, seen from his period of severe aphasia, the WWAAC browser would have been a very helpful therapy. Although there was a tendency to say that the browser especially helps when the user is tired or having a bad day, there was a difference of opinion as to whether they felt that the WWAAC browser would enable them to use the Internet more independently than before. The user who was accustomed to a normal browser preferred the normal browser software over WWAAC. This leads to the conclusion that a beginning Internet user who is disabled and without experience using the Internet, will have additional support using the WWAAC software.

The professionals were both volunteers, one with high experience with assistive technology, and one with low experience, both with medium level of experience with AAC, and both with high familiarity with the Internet. One professional gave the highest rating on a scale of 1 to 5 when asked what they thought about using the WWAAC browser to explore the Internet, while the other gave the lowest rating.

9.6.2 Workshop 2 in NL

The second workshop consisted of two mini workshops, the first one with 3 users and the second one with 4 users. It was not possible to interview all of the users for different reasons, and results from three of the users that were interviewed will be summarized.

The 3 females interviewed were aged between 36 and 45 years old and all had speech and language impairments. 2 of the users used the browser and were shown the email and one user was shown the email software (demonstration only). User 1 could access computers and the Internet independently, User 2 had used a computer once had no use of the Internet and required support and User 3 used the computer and Internet at home but required support.

The two users who used the browser thought it was very good. One of the users thought that the pictures on the buttons were very good and the other thought that they were good. With regards to the layout of the buttons, one user thought it was very good and the other user thought it was good. Both users found it very easy to select the buttons. The users liked the favourites page, scroll buttons and the large size of the buttons. Both users wanted to use the software again and thought that the WWAAC browser allowed them to access the Internet more independently than before.

All three of the users thought that the email software was very good. On a scale of 1-5 with 1 being the highest rating, two users gave the pictures on the buttons a rating of 1 and one user gave the pictures on the buttons a rating of 2. All three users found the layout of the buttons very good and selecting the buttons very easy.

All the users would like to use the software again and thought that it would increase their independence.

Two of the professionals were speech and language therapists specializing in aphasia and one was a volunteer. Two of the professionals had medium level of experience with assistive technology and one of the professionals had a high level of experience. One professional had a high level of experience with AAC while the other two had a medium level of experience and all of the professionals had a medium level of familiarity with the Internet.

9.6.3 Workshop in UK

A third workshop was held in the United Kingdom with 4 people with aphasia, as well as 3 related professionals. One spouse also attended the workshop and joined in discussions, and her responses are recorded as a 'user'. All the users had had aphasia for at least a few years, and all were over the age of 55. At least 2 users had additional visual problems from their stroke: one described experiencing tunnel vision and getting headaches from the computer screen, and another user required large print. Each of the end users had participated in a regular computer group, working with the World Wide Web and email, which was run by one of the professionals involved in the workshop. Although most of these users have a computer at home and receive emails from friends or family, many commented on the fact that they had now forgotten what they had learnt in this group, and none use the computer independently at the current time.

The three professionals were speech and language therapists, with experience working with adults with aphasia and communication needs. Each of the professionals had medium-high experience with assistive technology, high experience with AAC, and medium-high experience with the Internet. On a scale of 1-5 with 1 being the highest rating, all 3 professionals gave the WWAAC browser an overall a rating of 1 or 2, and agreed that it could enable their users to use the Internet more independently than before. Pictures on the buttons and the layout editor for both the browser and the email also received ratings of 1 or 2. The email software received an overall rating of 1 or 2, and 2 out of 3 professionals thought that their end users would be able to use email more independently with this software than before. The WSW, however, received an overall rating of 4. When asked if the browser and email provided all the functionality needed by users and their facilitators, there was mixed opinion, with one person commenting that it may not be technically possible to achieve this, and one emphasising that they would need to trial with users to be able to comment. However, there seemed to be consensus that the browser and email were clearer and simpler than mainstream software packages.

The browser was demonstrated off-line, with 3 pre-captured websites. The email (with Clicker) was also demonstrated off-line with a few messages pre-stored in the inbox. The WSW was demonstrated only to the professionals and not to the users, and there was little opportunity for hands-on experience.

Detailed comments are found in Appendix 18.

9.6.4 Key points from the three Aphasia Workshops

A professional stressed the fact that when working with people with aphasia, maintenance of skills is a key issue. Having simplified software is helpful, but it needs to be in conjunction with proper support structures (computer groups were 18 months ago but skills were now forgotten.) Support is needed first to teach people with aphasia how to use the software and then to enable them to maintain those skills over time.

It was clear that users would be able to give much better feedback if they had had the software for a few weeks – it was difficult to say much after just seeing it demonstrated. However, some interesting comments and suggestions were made, and these are summarised below:

9.6.5 Browser

From both of these workshops, some of the advantages of the WWAAC browser were seen to be:

- Favourites page
- Use of buttons rather than the mouse when tired or having a bad day
- Speech output, with easy access and lines around words and sentences (one user for example said that getting tired easily, it was helpful to listen rather than having to read)
- Flexibility, through the Layout Editor
- Large text through the use of Zoom-in button
- Colour on the buttons
- Ability to change text labels
- Ability to increase the width of the visual focus (the thickest width is clearer).
- Has the functionality needed by users and their facilitators

Suggestions from both users and professionals to improve the browser were to:

- Allow clicking on an acronym in order to get the long form (a professional suggested that this could be a right click function)
- Make the writing larger on the buttons
- Improve the speech quality
- On the Favourites Page, use an infill highlight rather than a box of colour around the edge, i.e. highlight the whole button
- Rather than highlighting borders for scrolling/switching through items, use a coloured background
- Allow more flexibility, e.g., by allowing only text, and not icons, on the buttons; as well as the ability to change the size and colour of font on the favourites page.

It was also evident that the one experienced user of the Internet did not see advantages over existing software, which indicates that, as in the case of the older users, the software's functionality must compare well with conventional browsers in order for it to be accepted by a wider range of user groups.

9.6.6 Email

From both of these workshops, some of the advantages of the WWAAC email were seen to be:

- Clear interface (large print and good icons)
- Nice and simple
- Ability to personalise photo contacts
- 'Exchange' facility (as the user has a dial-up connection and would not like to have to pay for unnecessary time online)
- Ability to use words (in selection sets) as well as the keyboard
- Ability to read sentence by sentence so as not to miss bits

Suggestions to improve the email software, made from both users and professionals, were to:

- Provide a zoom button for reading emails (like in the browser)
- Allow whole words (in selection sets), as for people with aphasia, symbols can be confusing. (Professional pointed out that Clicker has been introduced to a number of people, who have then rejected it. Sometimes better to have a word list next to the computer that they use to copy into their writing).

9.6.7 Supportive Writing

Of the workshops with people with aphasia, only the workshop in the UK demonstrated the WSW. This was demonstrated to the professionals rather than to the users. Some good points were highlighted:

- Liked the prompting of folder contents – the grey strip along the bottom.
- Good that it is guiding you to think about sentences

In addition, some problems and recommendations for improvement were also made:

- Might be good to always have the top menu along the bottom
- Someone more likely to choose 'is' than 'to be', i.e. should not use infinitive form of verb in selection sets.
- Should accept all forms of verbs and software modifies accordingly, e.g. 'we is going'
- Would prefer a list of a few words so choose something that is close. [note that this is probably referring to supplying a range of verb forms again]
- Wouldn't know whether to click on 'question' or 'question word'.
- Need a 'back' button, not just backspace. [Note that the backspace was not performing properly – jumped back lots of stages]
- Incredibly difficult.
- It's once you go to the next level that I find it very difficult [i.e. once you have made the initial choice of what type of sentence you want to say]
- A lot to learn linguistically and cognitively. May have application for therapy.
- Good concept, but people I see, if they had high enough level of language to use it, would be writing clear enough sentences to understand.

- Too complex linguistically, so message ends up very disrupted like a language translator.

These findings may have been affected by the fact that the version of the software being used was not functioning properly. For example, the backspace and undo buttons did not behave as intended. Instead of taking the writer back to the previous field, it went back to an apparently random location. This caused confusion and frustration, and it was necessary to restart the whole message if a symbol had to be changed. Some of the conjugation was also incorrect.

9.7 Further Workshops with Professionals

Two further workshops were held with professionals to demonstrate and collect feedback on the WWAAC software, using the most recent version of the coloured icons on the buttons.

9.7.1 Workshop in the NL

The first workshop was held in the Netherlands with 5 professionals from different backgrounds, including:

- An occupational therapist with visually impaired clients, with low experience with assistive technology, and medium experience with AAC, and medium familiarity with the Internet,
- An occupational therapist, with high experience with assistive technology, and medium experience with AAC, and high familiarity with the Internet,
- A teacher, with medium experience with assistive technology, AAC and the Internet,
- A Psycholinguist with high assistive technology experience, AAC and Internet experience, and
- A client assistant for people with multiple disabilities, with medium experience with assistive technology, AAC and the Internet.

Following a introduction to the project, the browser, email, and the supportive writing software were demonstrated, and then several computers, connected to the Internet, were made available for free browsing for about one hour. The speech output used was Lernout & Hauspie TTS3000 Dutch, and this was the focus of many remarks about the poor quality of the speech.

On a scale of 1-5 with 1 being the highest rating, 3 out of 5 professionals gave the WWAAC browser an overall a rating of 1. The other 2 professionals gave it a 2-3 rating. For the pictures on the buttons three professionals gave them a rating of 3 and two professionals gave them a rating of 2, and 4 out of 5 professionals gave the layout editor a rating of 2, with the other giving it a 3 rating. The professionals also thought that, at least in this first viewing, the browser provided all the functionality needed by users and their facilitators, and that users would be able to use the Internet more independently with this software than before. One professional thought that it was more accessible than mainstream browsers, but one felt unable to compare.

With regard to the email in general, on a scale of 1-5 with 1 being the highest rating, three professionals gave it a rating of 2 and two professionals gave it a rating of 1. When asked what they thought about the WSW, one professional gave it a rating of 1, 3 out of 5 gave a rating of 2, and the other gave a rating of 3. For both the layout editor and the pictures on the buttons, 3 out of 5 professionals gave a rating of 2, and the other two gave a 3 rating.

2 out of 2 professionals who answered the question thought that the WEM is better than mainstream email software, with one commenting specifically on the better symbols and buttons. Professionals liked the possibility of translation of mail into many languages or symbols, the speech output, and the scanning possibilities. With regard to the WSW, the professionals liked the educational aspect of being able to construct sentences. It was felt that the software comes close to providing all the functionality needed by users and their facilitators, although one professional said that it would do so only after everything that is promised has been included. 3 of the professionals said that the end users would be able to use email more independently with this software than before. However, it was noted that without using it with their own clients, it was not possible to say if they would be able to write better-formed sentences with the supportive writing, and that this will depend on the kind of training and support and the cognitive level of the user. Professionals also warned that until everything works perfectly, it can be frustrating for users.

9.7.2 Workshop in Finland

The second workshop was held in Finland with 4 professionals, including:

- An expert in Information Technology, with high experience with assistive technology, medium experience with AAC, and high familiarity with the Internet,
- An occupational therapist, with medium experience with assistive technology, AAC, and the Internet,
- An AAC support technician, with high experience with assistive technology, AAC and the Internet, and
- An AAC/IT professional, with high experience with assistive technology, AAC and the Internet.

The browser and email were demonstrated, without the writing support. On a scale of 1-5 with 1 being the highest rating, 2 out of 4 professionals gave the WWAAC browser an overall a rating of 1. The other 2 professionals gave it a 2 rating. Pictures on the buttons were evenly split between either 1 or 2, and 2 professionals gave the layout editor a rating of 2, with the other 2 professionals giving it a 1 and 3 rating.

One of the professionals noted that after such a short experience it was difficult to say how well it works with switches. Another noted that it was difficult to say if the browser provided all the functionality needed, but that if the browser has too many functions, it doesn't work well for anyone, so it is important to keep it simple.

3 out of 4 professionals also thought that users would be able to use the Internet more independently with this software than before; the fourth professional felt unable

to comment. In comparing the WWAAC browser with mainstream browsers, it was felt that it was clear and easy to use, the nearest equivalent being Inter_Comm. Another professional noted that modern browsers (MSIE, Opera, Mozilla, etc.) are so complex that soon nobody will be able to use them, and that compared to those, the WWAAC browser is a 'pleasant acquaintance.'

With regard to the email in general, on a scale of 1-5 with 1 being the highest rating, 3 out of 4 professionals gave a rating of 2; the occupational therapist did not wish to comment on the email software without testing it together with a client. For the pictures on the buttons, 2 out of 3 professionals gave a rating of 2, and the other gave a rating of 1 for the new pictures and 4 to the old ones. Regarding the layout editor, 1 professional gave this a rating of 1 and the other 2 gave it a rating of 2.

9.7.3 Workshop in Sweden

The WSW was demonstrated during a workshop at the joint meeting of the computer resource centre of southern Sweden. The audience consisted of 13 professionals. These professionals were predominantly speech and language therapists, but there were also a few occupational therapists and a consultant for the Service Delivery Bureau. The version of the WSW used was robust enough to conduct the demonstration. Questionnaires were not used, but feedback was gathered informally. This feedback has been integrated with that received at the workshop in the Netherlands in Section 9.7.4.3.

9.7.4 Key points from Professional Workshops

A summary of further comments and recommendations emerging from the three workshops is given below:

9.7.4.1 Browser

Professionals especially liked the favourites page, the ability to adapt and personalise when necessary, and the scanning possibilities. One professional especially liked the fact the web browser actually works! The following comments also emerged from both workshops:

- Takes a short time to understand
- With training it will be possible to understand
- It's fine that you can build a private layout, because it depends on the level of the client.
- Risk of too much information on the screen, but the personal adaptation is OK.
- Browser is easy to use and easy to customise using the layout editor.
- For students with severe learning disability, it will take a lot of instruction and training
- Too much detail on the pictures on the buttons – the new coloured symbols are good.

Suggestions for the future included:

- Use the pictures from Explorer, if not for the client then they would help the assistant.
- Use other, better symbols on buttons, or allow more choice in using one's own pictures or photos
- Allow choice
- Improve speech output quality
- Make text input easier, e.g. in the address line, next input, etc.
- Continue including user groups to update the software
- Make sure that the setup button for the layout editor is easy to access.

9.7.4.2 Email

With regard to the email software, professionals especially liked the clear interface, the speech support, and the fact that text converts into symbols. It was felt that the email software was further from completion and needs improvements related to functions like saving, replying, forwarding mail, adding attachments and copy / paste. The following comments also emerged from both workshops:

- The colours are fairly 'blond' and maybe colour-blind or visually impaired people will not see these pastel shades.
- Visually impaired people need contrast, and this hasn't always been used in the design.
- Using the 'normal' Internet symbols for buttons would be just as clear.
- Every user needs a 'programmer' to start the programs at his level, change things when necessary, develop with the user to use more complex aspects of the browser and email editor.
- Looks good – just take care of small flaws and bugs

Suggestions for improving both the email and supportive writing included:

- Ability to attach documents
- Ability to select multiple addresses
- Ability to forward a mail
- Ability to reply to a mail
- Ability to save a message
- Ability to copy/paste
- Ability to use of one's own pictures or photos
- Improve speech output quality
- Ability to change pictures on the buttons
- Remove the unnecessary marks and words from the received message, e.g. 'Original message . . .'
- While moving from one page to another, the menus should be the same.
- While using keyboard or on-screen keyboard speech feedback should be possible to remove.
- Include a sort of word prediction
- Stopping the Inbox from talking each time you go there.
- A set of standard sentences which can be chosen, e.g. start-finish of email can be fixed.

9.7.4.3 WWAAC Supportive Writing

Professionals in these workshops had mixed reactions to the WSW. At the workshop in the Netherlands, the WSW was felt to be good or very good by four of the five professionals. At the workshop in Sweden, however, the reaction was rather negative.

Suggestions for improving the supportive writing included:

- Supportive writing a good idea, but should be improved by making it possible to use more symbol systems
- Difficult for users to have a beforehand idea of the intended message [although this objection might have been less severe had it been pointed out that only the initial word has to be identified, not the whole sentence type]
- Program seems to be too complicated and complex for a user with language dysfunction
- It has to be more intuitive for both the users and the professionals to use on their own

9.8 Consultation on the WWAAC Supportive Writing Structures with an Expert in the Netherlands

This expert rated high on level of experience with assistive technology, AAC and the Internet. His impression of the WSW was positive (1 on a scale of 1-5 with 1 being the most positive). His answer to the question, “What do you think about the supportive writing?” was “Very nice”. Other comments included:

- The syntax is interesting but can be better
- Interesting software that is worth being further developed!
- WSW is of great importance for making email

Issues identified for improvement included:

- The syntax can be better, it must be possible to use the semantic rules at the end of the sentence (to solve some of the problems in Dutch conjugation, when the verb is cut into two words which are placed on different places in the sentence).
- It must be easy to fill in the adjective, this is important in the sentence structure used by children
- The article can be filled in automatically

9.9 Conclusion

User consultations with a range of user groups, over and above the target users of the project, has demonstrated that the ability to personalise Internet software (for example, through the provision of simple summaries of content and the ability to configure the interface to suit individual needs) can potentially provide more accessible and usable interfaces for a wide range of users. Even though the BBC has found that only a very small percentage of users want to personalise services, usually the most experienced users (Office of the E-envoy, 2003), it is only through

personalisation that some users will be able to access the Internet (Nicolle et al., to be presented July 2004).

These consultations with different user groups emphasise the importance of the speech support, the flexibility in configuring the user interface through the use of the layout editor, and the ability to keep it simple. However, they also make suggestions for even more flexibility, e.g., to be able to increase the size of the font on the buttons, to enable only text on the buttons, or to be able to use the standard Internet Explorer icons on the buttons if desired. Individual choice is paramount. It is also clear that the WWAAC software must not lose any of the functionality found in mainstream software if it is going to be attractive to a wide range of user groups. Furthermore, the user consultations have stressed the importance of training and support of the user, as well as the maintenance of skills over time, not just for the user but also for the facilitators.

Of course, personalisation of the system is not the only solution to accessibility and usability of the Internet for end users with communication needs. It is also vital that Web developers apply best practice in usability into their Web sites, as well as following Web Content Accessibility Guidelines (WCAG), as proposed by W3C–WAI, and discussed in WWAAC Deliverable 12a, Guidelines for developing an AAC-enabled World Wide Web.

The overall negative reaction to the WSW was disappointing, but not totally unexpected. The WSW never reached the status of a robust piece of software demonstrating the intended functionality. The basic idea of offering the writer guidance to achieve grammatically correct sentences that are possible to run through automatic translation was possibly obscured behind too many flaws. However, some of the experts did acknowledge the potential of a writing support of this kind.

10 SUMMARY AND CONCLUSIONS

10.1 Overview

The WWAAC project has sought to involve users at each stage of the design and evaluation of the WWAAC software. This report has documented the findings from this process, following the user requirements capture reported in Deliverable 2.

Evaluation has involved eight phases:

- Simulation Study
- Evaluation of the WWB, Alpha Version
- Evaluation of the WEM, Alpha Version
- Pilot Evaluation of the Linguistic Support Module
- Evaluation of the WWB and WEM, Beta Version
- Longitudinal Case Study of the WWB and WEM
- Longitudinal Case Study of the WWB and WEM, including the WSW
- Additional Investigations or User Consultations

User feedback has been, on the whole, extremely positive. The comment of the young man in the simulator study who when asked whether he had any suggestions, just responded, “When will it be ready?” has been echoed throughout the evaluation activities. The software has also benefited extensively from the in-depth feedback and suggestions from users, facilitators and experts, with the WWB and WEM enabling significant increases in independence in Internet and Email usage for users. Longitudinal trials of the WWB and the WEM indicated that the WWAAC software is addressing issues relevant to people who use AAC. Many users involved in the trials made use of the Internet and Email for the first time. This in itself was a positive outcome from the evaluation process.

While the WSW has not been so extensively evaluated due to some technical issues, there are some positive early indications. More research is required to further develop this innovative and potentially invaluable application.

10.2 Evaluation Process

The evaluation methodology has been detailed in Deliverable 13, Final User Interface Report: The Evaluation Plan. The innovative methodology employed has proved to be robust, and has enabled people with complex communication needs to take an active role in the process of software development. Flexibility in the application of the methods and tools has been important to take into account the developing state of the software, and the needs of individuals. Through close working with the technical partners, there has been a sensitive and iterative process of software development that has responded to many of the requests and suggestions made by users, facilitators and experts.

Involving our primary target population meaningfully in the evaluation process has been challenging at times, and has required flexibility in the application of methods and tools. The potential tension between the requirements of software developers

versus the requirements of involving people with complex communication needs in the evaluation process has already been discussed. This has also required flexibility, and has at times meant delays in some of the evaluation activities until more robust versions of software were released.

The evaluation team has sought to avoid exposing end users to software that is insufficiently robust for realistic and fairly independent evaluation. However, that has not always been possible. In the case of the WSW in particular, it appears that technical problems have at times masked the underlying functionality to such an extent that meaningful evaluation of the WSW has been difficult. When technical problems have arisen during trials, all evaluators worked hard to ensure that users did not feel that they were the cause of these problems.

Evaluators actively encouraged users to give them negative as well as positive feedback on the software. This was formalised in a 'getting to know the user and fostering openness' activity in the beta phase, documented in Section 8.4 of Deliverable 13. Users and their facilitators have made many recommendations and suggestions for change over the course of the evaluation process, and these have been fed back to the technical partners. This has resulted in software that has been informed by end users at all stages in its development. At times, this has been an empowering experience. For example, it was possible at the time of the longitudinal phase to show a user how the icons had been changed in accordance with her suggestion.

A number of factors have emerged as being of influence during the evaluation of the software by end users:

- Characteristics of the user themselves e.g. enthusiasm, motivation, ability
- The degree of support available from a committed facilitator
- The presence of technical support and training opportunities
- The software's reliability and compatibility with existing systems
- The design of web pages of interest to the user

10.3 Summary of the Eight Phases of Evaluation

Section 2 reported the results of evaluation activities carried out during the development phase of the simulated WWAAC web browser. The evaluations involved expert evaluations, preliminary user evaluations, a user workshop at ISAAC, a user workshop at Communication Matters, and an evaluation of Inter_Comm email software. Twenty-two end users were involved in this process, and a large number of recommendations for development targets were made. These recommendations were discussed within the consortium, and informed the development of the WWB. Prototype software for WWAAC Email was not available at this stage. However, the implications gathered from the evaluation of Inter_Comm email software were fed back to the consortium, and informed the development of the WEM.

Section 3 reported the results of the evaluation of the Alpha version of the WWB with seven end users. As in the earlier simulator studies, the overall feedback was positive from both end users and facilitators. The features already provided in this version of the WWB were much appreciated, and even in its current form, it was

considered a useful and valuable application, which could facilitate independent Internet usage for end users with complex communication needs. Recommendations were fed back to the technical partners. While the alpha evaluation of the WEM did not take place with end users, a productive internal workshop was held. These findings were reported in Section 4. Technical partners were encouraged to make use of these findings to rethink the user interface of the WEM and produce software that shared more of a look and feel with the WWB.

The linguistic pilot investigations were reported in Section 5. Two end users took part in the more formal investigations, and two were involved more informally in giving feedback. These investigations were quite challenging owing to the instability of the WSW at that time. Key functionality was also missing from the software, and it was not integrated with the WEM. These problems made it difficult for evaluators to conduct informative and productive investigations with end users, and the end users found the experience quite frustrating. Recommendations for improvements to the WSW prior to further user evaluation activities were made.

Section 6 reported the findings of the evaluations of the Beta versions of the WWB and WEM. The beta evaluations involved a total of eighteen end users. The general reaction of the end users involved in the evaluations to both the WWB and the WEM was positive. Many of the users made use of the Internet for the first time at these trials, which is a result in itself. All of the facilitators were positive about the WWB and WEM, and they could perceive benefit to AAC users from the software. Reassuringly, no major problems were identified. Again, recommendations were fed back to the technical partners throughout the evaluation process.

The findings from the longitudinal trials of the WWB and WEM were reported in Section 7. Owing to earlier technical delays and the need to ensure that the software was robust enough for the trials to be feasible, the longitudinal trials took place during quite a compressed period of time. This put a lot of pressure on the trials to go smoothly to ensure rich data collection during this shortened time period. Unfortunately, this was not always possible. While some trials were very successful, others encountered technical problems and practical difficulties outside of the project's control, such as a key facilitator being ill, gaps for Easter holidays, etc.. However, some rich data was collected, and reported in a case study format.

The findings of the longitudinal trials with the WSW were reported in Section 8. Sadly, like the pilot investigations of the WSW, these trials were again compromised by technical problems and could only take place with two end users. While it was possible to gain some information from these trials, more research into the WSW is clearly warranted.

User consultations with a much wider range of users, facilitators and experts were carried out, and the findings were reported in Section 9. More than seventy individuals were consulted during this more informal process, and on the whole, the feedback was extremely positive. These consultations demonstrated that the ability to personalise Internet software such as the WWB and WEM can potentially provide more accessible and usable interfaces for a wide range of people. The overall negative reaction to the WSW during the user consultations was disappointing, but

not totally unexpected. However, some of the experts did feel that there was potential in a writing support of this kind.

10.4 WWB and WEM

The initial impression of the simulator browser software by experts was very favourable, and it was perceived to be much better than other Web browsers for the primary target group. Preliminary evaluations with users also confirmed that the software was a significant step towards independent use of the Internet by people who use AAC, and these views have been reiterated and confirmed throughout the evaluation process. Furthermore, user consultation activities indicate that the software has the potential to be of benefit to a far wider range of users than the primary target group initially identified.

10.4.1 WWB Features

10.4.1.1Speech Support

At all phases of the evaluation process, users found the speech support offered by WWB particularly helpful. It also emerged as a key feature of benefit during many of the user consultation activities. For the primary target user group, flexible speech controls are clearly required, and many practical suggestions have been made and incorporated into the software. By the beta phase, users appreciated being able to control speech characteristics such as rate and speed more independently, but asked for more feedback on the changes made. Interestingly, during the alpha evaluations, facilitators made a number of negative comments about using more traditional screen readers to facilitate Internet access e.g. the complexity of selecting and navigating text, links and images. This endorses the approach of synchronising speech support in the WWB with the visual focus on the web page, something that does not require any highlighting, cutting or pasting of text.

10.4.1.2Favourites Page

Again, at all phases of the evaluation, including the user consultation phase, the visual favourites page was clearly valued, and seen as one of the key methods by which the software assists users in accessing web pages. The ability to identify websites with pictures rather than a text-based URL is one of the key strengths of the WWB. The large graphics, available from the alpha version, were endorsed. At the alpha phase, facilitators recommended giving users more independent control over their favourites page. During beta evaluations, users were given the opportunity to try out an ‘add to favourites’ feature, and the majority of users gave positive feedback about this. The use of a thumbnail image of newly added web page that could later be changed by a facilitator was also endorsed.

At a beta workshop, a facilitator expressed a reservation that the favourites page may limit users from free browsing. However, the degree to which the favourites page is used is of course entirely optional, and it is possible to set an alternative site as a home page. For some users, the favourites page may only be a safety net, while for others it may form the basis of most of their Internet experience. It should also be noted that there is a facility within the browser to permit users to search for

new sites on the Internet using symbol-supported items from pre-prepared selection sets. This is intended to help users move out beyond the confines of the favourites page.

10.4.1.3Entering Information Online

As noted above, one feature designed to help users move beyond the favourites page is the facility to input symbol-supported text onto a web page, and therefore conduct a search if required. Of course, this facility can also be used to input text into any online field on a web page. The majority of users who tried this facility during the beta evaluations, had a positive experience of searching on the Internet. Encouragingly, during the longitudinal trials, a number of users made more spontaneous use of this facility to move beyond their favourites page. An analysis of the logging files collected during the longitudinal phase, for example, indicates the search engine Google was visited during 1 session by NL Users 3 & 5, 2 sessions by UK User 2 and SE User 2, 4 sessions by SE User 1, and 6 sessions by SE User 3.

However, some users commented on the lack of clarity of the presentation of the findings of this search. On Google, for example, there is a lot of 'irrelevant' text at the top of the site, that a switch user in particular must read through before they get to their search results. A comparison of the way in which different search engines present information might be a useful exercise, and recommendations for a more usable interface may need to be produced in the future. Search engines are further discussed in the guidelines Deliverable 12A.

10.4.1.4Summary Page

During the alpha evaluation in particular, the summary page was highlighted as being important for aiding navigation. Even with the support of the summary page however, some users still experienced difficulties with long lists of links. At the beta evaluations, feelings about the summary page were more mixed. The summary feature was used by a number of users during the longitudinal trials, although specific feedback was not collected on their views. UK User 2, for example, used the summary eight times, and NL user 1 used it 10 times.

The summary page was intended not only to support navigation, but also to support understanding of web page content. During the user consultation phase, the expert on dyslexia saw potential for users who have difficulty trying to find relevant information and who would prefer not to have to read through everything on a page. During the beta phase, three users did feel that the summary feature supported their understanding of web page content. However, others did not. One of the main difficulties was that the information is not always available on the web page to enable the software to produce an adequate summary of content. This is an area that is being addressed in the guidelines deliverable, Deliverable 12A.

At the simulator evaluations, the importance of enhancing this summary page with symbol support was highlighted. It was not possible for this to be realised during the evaluation process, beyond the simulator trials. Later mock ups of symbol support for summaries can be seen in Appendix 4 of Deliverable 12A. However, for the longitudinal evaluations, a 'news' site, which demonstrated the principles of symbol

embellishment was produced. Due to a difficulty with the style of the page, this site was not very compatible with the WWB's screen reader, and a number of users during the longitudinal trials made comments about this. This meant that, in practice, few users visited this site, and it was not possible to obtain good feedback on the concept of symbol embellishment from this exercise. However, some feedback was gained. User 3 in the Netherlands did specifically comment on the fact that she had appreciated seeing bliss symbols on the page, for example, and User 1 also reported liking the site. There is a clear need for more research to be conducted on meaningully repurposing the content of web pages.

10.4.1.5Managing Links on a Page

Although the summary page was found to be of benefit to some users as a navigation strategy, users still struggled with long lists of links on pages that had to be scrolled through before arriving at the main content on the page. Repeated selection of the 'next link' button was one of the key frustrations at the alpha trials. By the beta phase, a new function called 'skip 5 links' was introduced, and this was greeted favourably by users. At beta evaluations, it was discovered that the BBC website, www.bbc.co.uk was making use of a hidden link called 'skip to main content'. This enabled users to bypass long lists of links along the top and down the left hand side of the page. For English-speaking switch users in particular, this was seen to be of great benefit. These issues have led to two guidelines recommendations, as described in Deliverable 12A: add clear in-page link such as 'Skip-to-Content' near the top of the page (as some web developers already do), and consider the number, location and focus of links on a page.

10.4.1.6Button Layout

At the beta trials, there were some negative comments about the layout of the buttons. Although a layout editor was available for the beta trials, there was often not sufficient time available during the workshops to make many changes. It may be that with more time, some of the concerns could have been addressed, and certainly at the time of the longitudinal trials, they did not emerge as an area of significant concern. However, a key request from some users was to maintain the same interface as is used for other activities. It was encouraging to note that despite criticisms of the button layout, most users still found it easy or very easy to select the buttons at the beta trials.

10.4.1.7Web Page Design

Although there were errors and problems with the WWB itself, bad design of web pages was sometimes to blame for difficulties. For example, the 'next frame' feature struggled with sites containing large numbers of frames. The widespread use of Flash and Shockwave on websites also caused problems for the WWB.

Unfortunately, sites of interest to the primary target group of users such as pop stars, television programs and games are often the worst culprits for this. While it was possible to control for this to some degree during the alpha and beta evaluations by pre-selecting sites for the favourites page that were compatible with the browser, during the longitudinal trials, users were more exposed to the realities of the Internet.

This, in a sense, was a major external influence on these trials. At one user consultation workshop with a younger user who was particularly into football, the evaluation had to be abandoned as no accessible sites of interest could be identified, and he lost interest. One facilitator remarked that we need to work on the 'rest of the world'. These inherent barriers of website design may always remain to a degree but can and should be reduced by educating the web developers and designers with guidelines and standards for accessible design for different user populations. It is vital that Web developers apply best practice in usability into their Web sites, as well as following Web Content Accessibility Guidelines (WCAG), as proposed by W3C–WAI, and discussed in WWAAC Deliverable 12a, Guidelines for developing an AAC-enabled World Wide Web.

10.4.1.8WWB as a Training / Therapy Tool

While the majority of comments made about training were to do with ensuring effective usage of the software by users and facilitators (see below), a number of comments were made at various stages during the evaluation process, about WWB's potential as a training or therapy tool. For example, a user with dyslexia felt that the experience of using the WWB might improve his reading comprehension and confidence. User N, who uses bliss symbols to support her face-to-face communication, was also enthusiastic about its role in her ambition to develop her literacy skills. This potential was not directly investigated during the trials but may be of interest for future evaluation work.

10.4.2 WEM Features

10.4.2.1Speech Support

As with the WWB, the speech support offered by the WEM was valued by users and their facilitators. However, the speech support offered in WEM was more limited than that offered in WWB, and this was commented upon by a number of users. In the UK, for example, User 3 made an important point about using text-to-speech to help her understand emails. She had a choice of 'next sentence' or 'read all' available to her. As a single switch user, she was reluctant to use 'next sentence' throughout a long email. However, despite slowing the rate of speech, she found it hard to process a long email read aloud in one go. She felt that the 'next paragraph' control, which can be found on the WWB, was valuable, and should be implemented in the WEM. Similarly, in the Netherlands, User 3 remarked upon the lack of a 'stop' button for cancelling a 'read all' command. This function was present in the WWB. Users also wanted more control over what is and is not read aloud in the WEM. For example, one user involved in the beta trials suggested turning off the speech in the inbox, and User 3 in the UK longitudinal trials only wanted the subject and author to be read.

10.4.2.2Addressbook

The graphical addressbook in WEM performed a similar function to the WWB's favourites page, and was similarly valued. During the beta phase, this addressbook was not linked to the inbox or outbox. This meant that emails from known recipients appeared in the Inbox with question marks on the subject line rather than their

photograph. This elicited some criticism from users, and the problem was resolved during the longitudinal trials.

10.4.2.3Composing Emails

Most users felt positive about composing a short email during the beta trials. Although one user felt very negative about this, this was probably due to the fact that a technical error prevented him from selecting vocabulary using his switch. The use of the 'exchange' button, which some had feared might introduce an additional level of complexity, was not identified as a problem by any users at the beta phase. The information presented to users whilst the exchange process was taking place, however, was criticised, and attempts were made to modify this during the longitudinal trials.

At the longitudinal trials, users made use of customised selection sets to compose emails. For some users this vocabulary was very familiar, and already used in other applications. Encouragingly, some users were able to make use of grids in other applications to compose emails, such as Clicker. However, for users who did not have such vocabulary, not only did they have the task of learning how to operate the WEM, but they also had to become familiar with new vocabulary. Facilitators in these conditions also had the additional burden of updating and modifying this vocabulary, in addition to supporting the users in using the software. Given the relatively short length of these trials, fully independent access to the software was not a realistic aim for such users.

10.4.3 WWB & WEM Shared Issues

10.4.3.1Icons

During the simulator study, and the alpha and beta evaluations, the icons on the browser were felt to be problematic by users and facilitators alike. This led to the production of a new set of icons for use during the longitudinal phase. In addition to being important in assisting users in learning the functionality, making this change was also a very visible way of demonstrating to users who went on to participate in the longitudinal trials that their recommendations and feedback was being listened to and acted upon.

While the feedback on the new set of icons has been more positive, some difficulties were still identified. At the beta WEM evaluation, a number of users expressed a neutral opinion and one felt they were very bad. The facilitator at the user consultation workshop with elderly people felt that the icons needed to be more meaningful, and this comment was echoed by other professionals. Some of the icons were also still difficult to differentiate from one another. User N at the Barcelona workshop, for example, commented on her difficulties in differentiating between the different icons relating to links. A professional during the user consultations also noted that the icons may not be suitable for people with visual impairments, due to their lack of contrast. There also remains a need for facilitators to be able to put users' own icons into the browser via the Layout Editor. This request has been made throughout the evaluation process.

10.4.3.2Switch Access

Feedback from sessions with switch users, particularly those using a single switch auto-scan, indicates that more work is required to improve the efficiency of switch access to the WWAAC software. For example, during the user consultation phase, User I requested additional flexibility in controlling the scanning (being able to set it to scan within one group) to improve efficiency. Negative comments have also been made about the reliability of switch access to the software.

Extensive customisation must be possible for switch users to get the most out of the software, and the combination of the settings and the layout editor does provide much flexibility. In a sense, this may be seen as sufficient for the purposes of the WWAAC project, with reliable access from a user's existing switch input system (e.g. SAW, The Grid etc) being more of a priority. However, more sophisticated flexibility incorporating some of the recommendations made during the evaluation process may be more relevant once the product becomes a commercial entity.

During the alpha and beta evaluations, some of the difficulties experienced may have been due to the fact that customising a piece of software to meet an individual's needs is normally accomplished over a number of sessions. In other words, problems may have been more about the structure of the workshops rather than the software itself. However, there were still criticisms at the longitudinal stage. While some of these were about issues of reliability, there was a concern about the use of 'next' and 'previous' buttons by a single switch user for making use of the favourites page, the addressbook, and mailboxes. This was felt to be less efficient than a more direct auto scan of the items on these pages, and this information was fed back to technical partners.

10.4.3.3Integration with Other Applications

The integration of WWAAC software with existing hardware and the users' own software and symbol sets, has been consistently highlighted as being of great importance. As noted above, when asked about button layouts, users have often requested that they are able to control the application from their own familiar interfaces. The presence of keyboard shortcuts for functions in WWAAC software does in fact mean that this is possible, provided that their software can emulate keystrokes. Experimental sets were produced within SAW, for example, and some users composed emails using Clicker grids. It will be important to consolidate this inter-operability at the commercial phase. The involvement of a wide range of software developers in the concept coding workshops is also encouraging from this point of view.

10.4.3.4Advanced Functionality

To some extent, the WWAAC software offers a reduced amount of functionality in comparison with mainstream browser and email applications. During the evaluation process, this presented particular difficulties for users who were familiar with mainstream email applications, as, understandably, they missed functionality with which they were already familiar, e.g. forwarding mail, dealing with attachments. It is possible that in some cases, the lack of this functionality may have coloured users'

attitude towards the functionality that was in the WEM. During most of the evaluation process, comments about missing functionality were predominantly directed towards the WEM. However, at the user consultation exercise with elderly Internet users, a few missing features of the WWB in comparison with Internet Explorer were highlighted, e.g. history of sites visited, being able to open more than one window at a time, etc. This suggests that people with higher levels of experience of using Internet Explorer than many of the end users involved in earlier trials might be frustrated by the lack of some familiar functions if they switched to the WWB. The WWAAC software must not lose any of the functionality found in mainstream software if it is going to be attractive to a wide range of user groups, particularly those with previous Internet or email experience. However, it does appear that for the primary target group, this criticism is much more applicable to the WEM than the WWB.

10.4.3.5Layout Editor

Throughout the evaluation process, facilitators have emphasised the importance of being able to configure the software flexibly to meet the needs of individual users. A Layout Editor was seen to be essential, and one was available by the beta phase of evaluations. The flexibility provided by the Layout Editor is a key feature that distinguishes the software from mainstream applications.

The Layout Editor makes it possible for facilitators to extensively tailor the software's functionality to the capabilities, limitations and preferences of each user. However, at the user consultations, some additional requests were made, such as the ability to increase font size on buttons, and to have 'text only' buttons.

Significantly from a training point of view, the Layout Editor also enables facilitators to gradually introduce functionality over a period of time, so that end users are not initially overwhelmed by the range of functions available. Evaluators also made extensive use of this facility during the beta trials, the longitudinal trials, and the user consultations. Some facilitators also operated the Layout Editor during the evaluations, but training and support was required from facilitators.

Experiences of the evaluators in adapting the interface for particular users have led to a number of recommendations for default configurations that would be useful starting points for particular user groups. These can be made available for facilitators when the software becomes a commercial product. Some of these layouts can be found in the appropriate Sections of this document: for a single-switch user see Section 7.1.1, for people with learning disabilities see Section 9.4, and for elderly users see Section 9.3.

10.4.3.6Reliability

There were a number of technical problems at all stages of the evaluation process. Facilitators have repeatedly stressed the importance of reliability for software to be used by people with complex needs. Users, particularly during the longitudinal trials, also made this point clearly. In the UK, for example, User 3 specifically identified stopping the browser crashing and improving reliability as the key improvements that would make the software easier to use. Other users in the longitudinal trials clearly

reported feelings of being disheartened by the lack of reliability and technical problems.

10.4.3.7Network issues

This issue arose in the UK, where the evaluations primarily took place in schools and colleges rather than in individuals' homes. In such institutions, mainstream browsers and email applications are often on a network. At the current time, the WWAAC software runs much better on standalone computers. For the commercial phase, multi-user capability or the facility for roaming profiles will be important.

10.4.3.8Training

Training on the software is an issue that has been discussed with facilitators throughout the evaluation process. For an end user to get the most out of the software, as one professional remarked, they need a 'programmer' to make effective use of the Layout Editor on their behalf. Facilitators must be able to feel confident in using this software, and encouragingly, some facilitators did begin to make use of the Layout Editor during the longitudinal trials. At the exploitation phase, robust manuals and online help facilities will be required.

In addition to manuals, wizards, and online help, for naive Internet users with complex communication needs, there may also be a requirement for appropriate basic Internet awareness training. While this is beyond the scope of WWAAC, it is important to note that this need is out there. Having said that, some users during the longitudinal phase surprised their facilitators by the speed at which they picked up key concepts. In the UK, for example, User 2 was able to grasp the concept of links and web pages through use of the software, despite having little previous Internet experience.

10.5 User Requirements Met?

It is interesting to compare the software at the time of the longitudinal trial with the specification features required by and for people with complex communication needs in the User Requirements Document. Appendix 19 lists the usability goals that the product must satisfy for each high level specification feature, and then assesses the degree of match between the two. This does not attempt to cover each individual function of each piece of software, but instead looks at high level design and functionality of the output of WWAAC and how it meets the user requirements identified in the early stages of the project. This 'snapshot' then makes recommendations for actions required for the final development of the software. It will be updated during the final consortium meeting, and may be updated again after the project's end.

10.6 WSW

Feedback on the WSW has been quite mixed. However, it is hard to be confident in findings obtained given the difficulties with the software. At times the core functionality was masked by all the technical problems, making it difficult for users and professionals to understand what they were evaluating. The longitudinal trials

were too compressed for the users to have time to learn how to use the software, and the lack of integration with the WEM, took away the motivation for working on the WSW i.e. to be able to send grammatically correct sentences in emails. Instead, users were working on formal tasks and exercises, and relied upon evaluators being present. This combination of factors has resulted in a paucity of findings to report.

Despite the serious problems noted above, there has been some positive feedback. At the user consultation workshop in the Netherlands, for example, four of the five professionals rated the WSW as being either good or very good. Some interest has also been expressed in the role of the WSW as a training or therapy tool. Professionals at an aphasia workshop in the UK remarked on innovativeness of the strip along the bottom of the WSW, which prompts users as to the contents of folders, and were able to make some practical suggestions, such as querying the reliance on the infinitive form of the verb in the selection sets.

A number of key recommendations for improvement were made at the time of the pilot investigations, and these remain valid:

- The WSW needs to be made more stable and less complex
- Missing features and functionality should be implemented, especially 'backspace' and 'undo'
- More training must be given to users on the WSW
- The WSW interface has to be made more intuitive.

Further research on the WSW is being planned for the future.

10.7 Concluding Remarks

The WWAAC project has sought to involve users at each stage of the design and evaluation of the WWAAC software. Innovative and successful user engagement strategies have been used to maximise involvement and participation in the development of the software by people with complex communication needs. This has been both challenging and rewarding, and has been a significant step away from the tokenism that can be characteristic of 'user-centred' assistive technology projects. At times the tension between the requirements of the technical developers for quick feedback to enable rapid software development versus the requirements of people with complex impairments for robust and reliable software has been difficult to manage. However, through close working relationships between consortium members, and a flexible approach to the application of evaluation methods and tools, many of the problems have been overcome. The result is both software that is, on the whole, widely endorsed by users, facilitators and experts alike, and a sophisticated, user-centred evaluation framework that other assistive technology research projects can benefit from.

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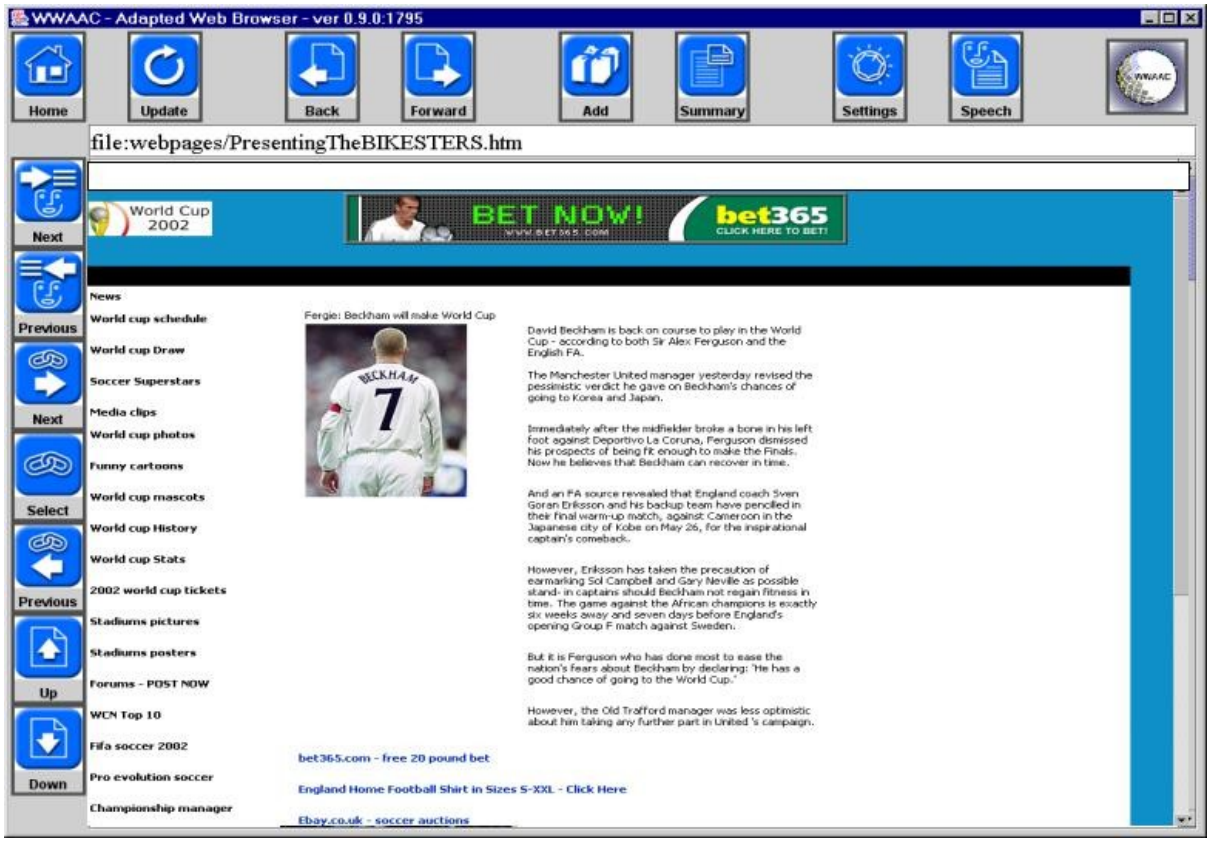
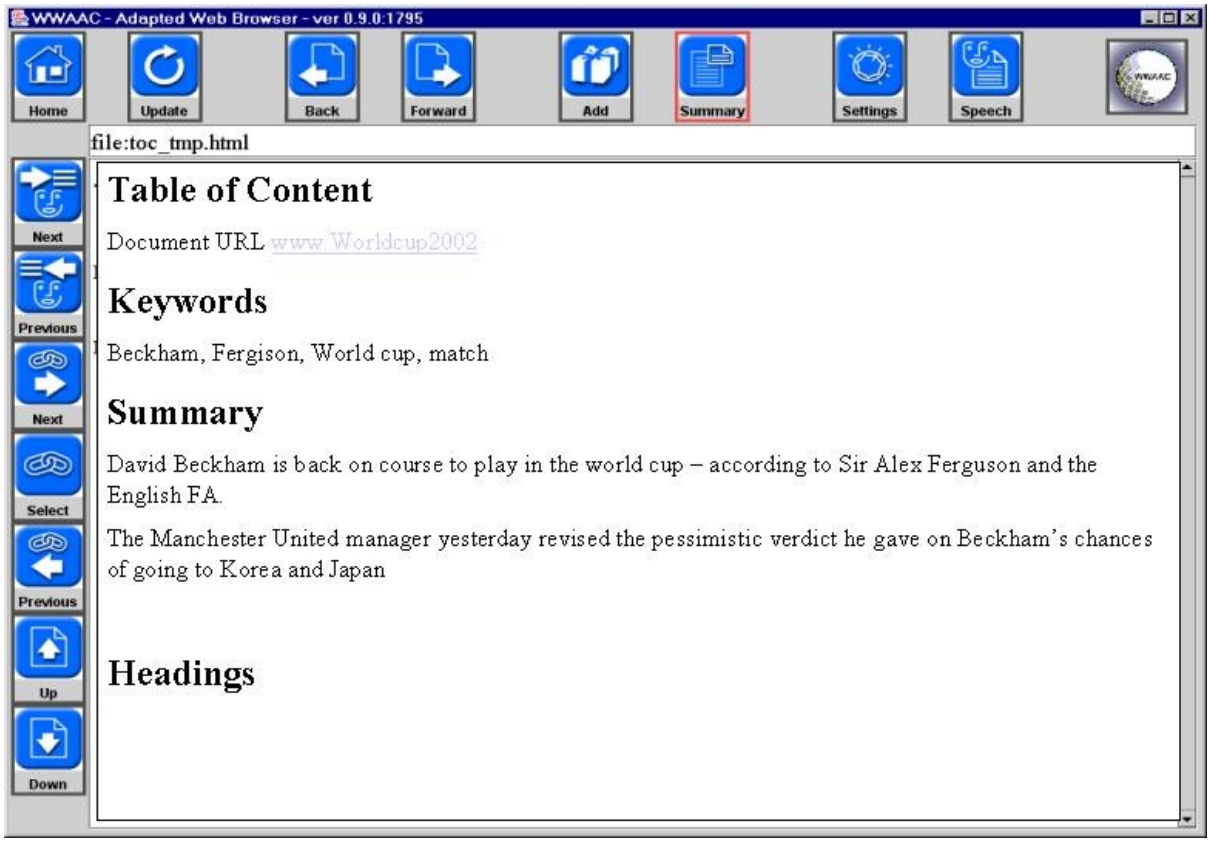
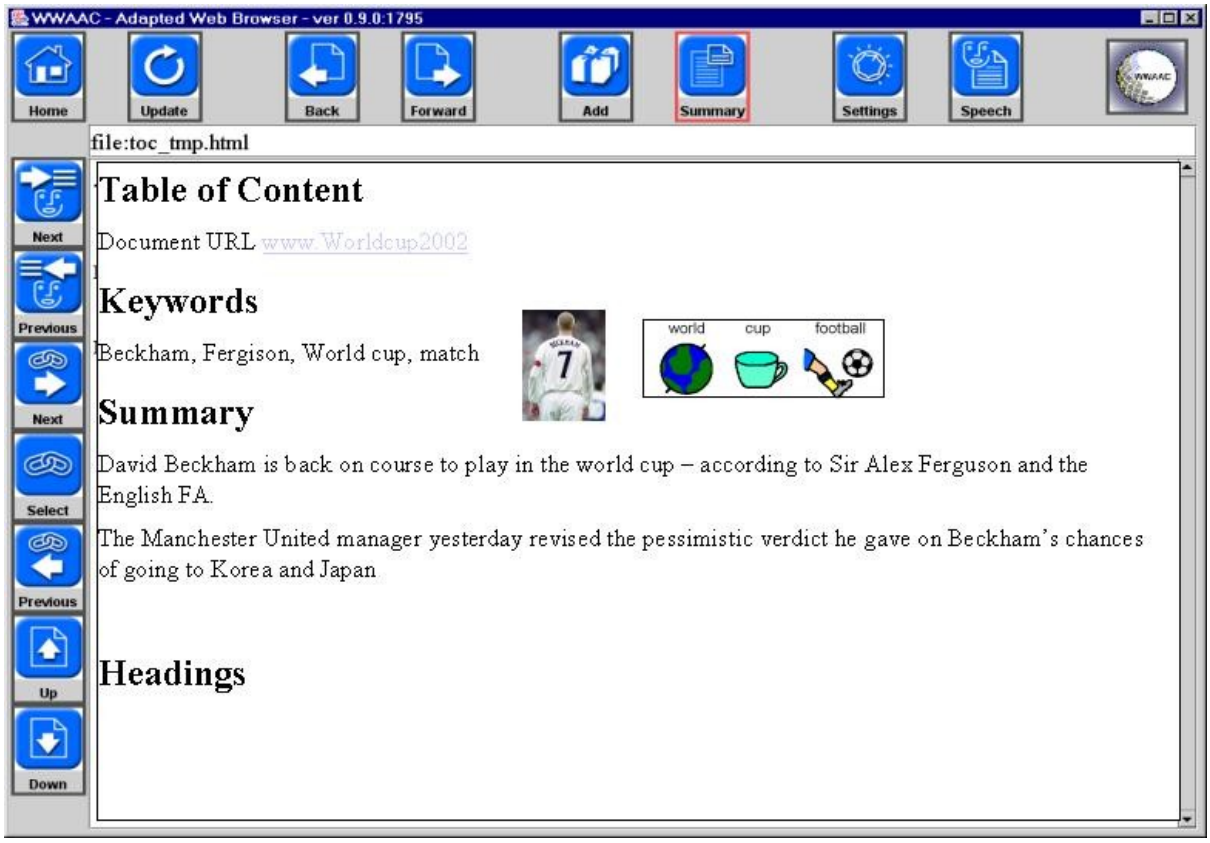
APPENDICES

APPENDIX 1: IDEAS FOR SYMBOL EMBELLISHMENT PRESENTED DURING SIMULATOR STUDY (SAMPLE SCREEN SHOTS)


WWAAC - Adapted Web Browser - ver 0.9.0:1795
Home
Update
Back
Forward
Add
Summary
Settings
Speech
file:webpages/PresentingTheBIKESTERS.htm
Next
Previous
Next
Select
Previous
Up
Down
World Cup 2002
BET NOW!
bet365
CLICK HERE TO BET!
News
World cup schedule
World cup Draw
Soccer Superstars
Media clips
World cup photos
Funny cartoons
World cup mascots
World cup History
World cup Stats
2002 world cup tickets
Stadiums pictures
Stadiums posters
Forums - POST NOW
WCN Top 10
Fifa soccer 2002
Pro evolution soccer
Championship manager
Fergie: Beckham will make World Cup
David Beckham is back on course to play in the World Cup - according to both Sir Alex Ferguson and the English FA.
The Manchester United manager yesterday revised the pessimistic verdict he gave on Beckham's chances of going to Korea and Japan.
Immediately after the midfielder broke a bone in his left foot against Deportivo La Coruna, Ferguson dismissed his prospects of being fit enough to make the Finals. Now he believes that Beckham can recover in time.
And an FA source revealed that England coach Sven Goran Eriksson and his backup team have pencilled in their final warm-up match, against Cameroon in the Japanese city of Kobe on May 26, for the inspirational captain's comeback.
However, Eriksson has taken the precaution of earmarking Sol Campbell and Gary Neville as possible stand- in captains should Beckham not regain fitness in time. The game against the African champions is exactly six weeks away and seven days before England's opening Group F match against Sweden.
But it is Ferguson who has done most to ease the nation's fears about Beckham by declaring: 'He has a good chance of going to the World Cup.'
However, the Old Trafford manager was less optimistic about him taking any further part in United 's campaign.
bet365.com - free 20 pound bet
England Home Football Shirt in Sizes S-XXL - Click Here
Ebay.co.uk - soccer auctions


WWAAC - Adapted Web Browser - ver 0.9.0:1795
Home
Update
Back
Forward
Add
Summary
Settings
Speech
file:toc_tmp.html
Next
Previous
Next
Select
Previous
Up
Down
Table of Content
Document URL www.Worldcup2002
Keywords
Beckham, Fergison, World cup, match
Summary
David Beckham is back on course to play in the world cup – according to Sir Alex Ferguson and the English FA.
The Manchester United manager yesterday revised the pessimistic verdict he gave on Beckham's chances of going to Korea and Japan
Headings


WWAAC - Adapted Web Browser - ver 0.9.0:1795
Home
Update
Back
Forward
Add
Summary
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Speech
file:toc_tmp.html
Next
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Next
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Up
Down
Table of Content
Document URL www.Worldcup2002
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Beckham, Fergison, World cup, match
world
cup
football
Summary
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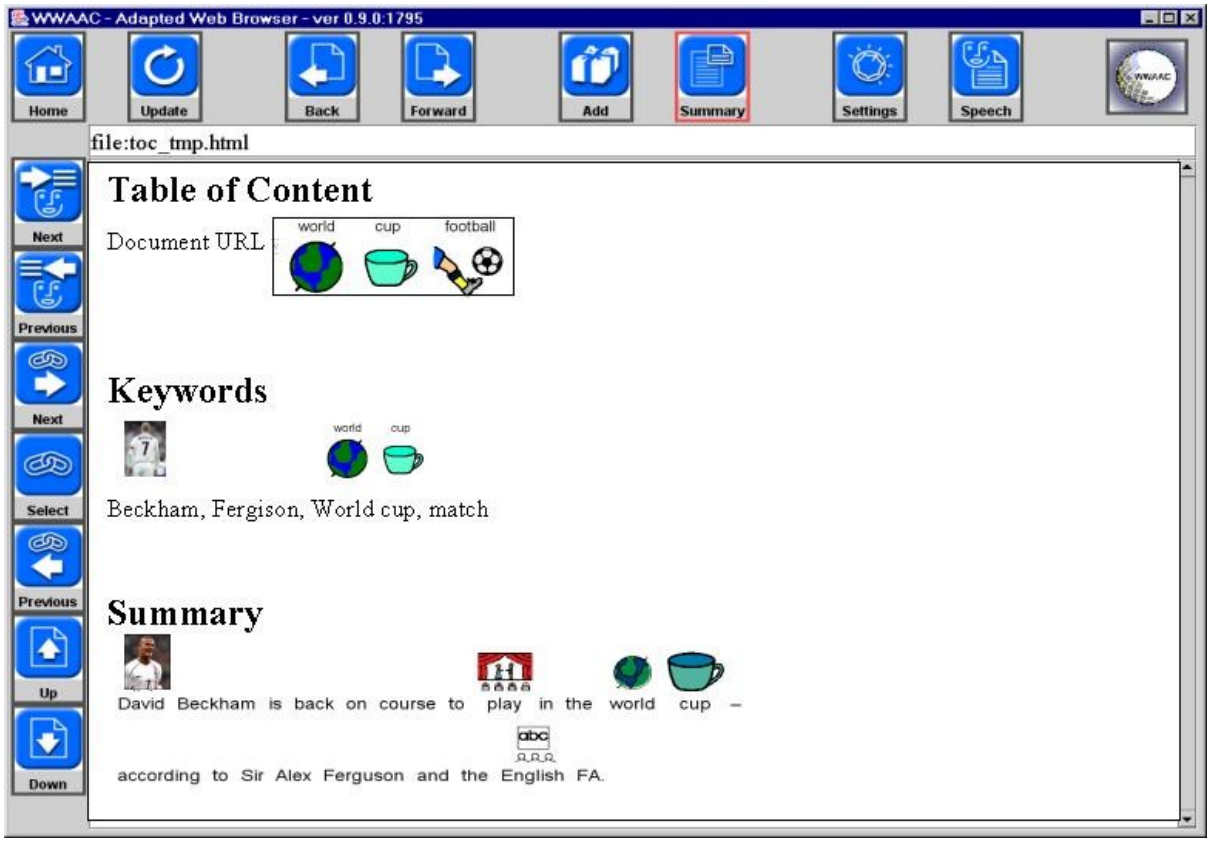
The Manchester United manager yesterday revised the pessimistic verdict he gave on Beckham's chances of going to Korea and Japan
Headings


WWAAC - Adapted Web Browser - ver 0.9.0:1795
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Update
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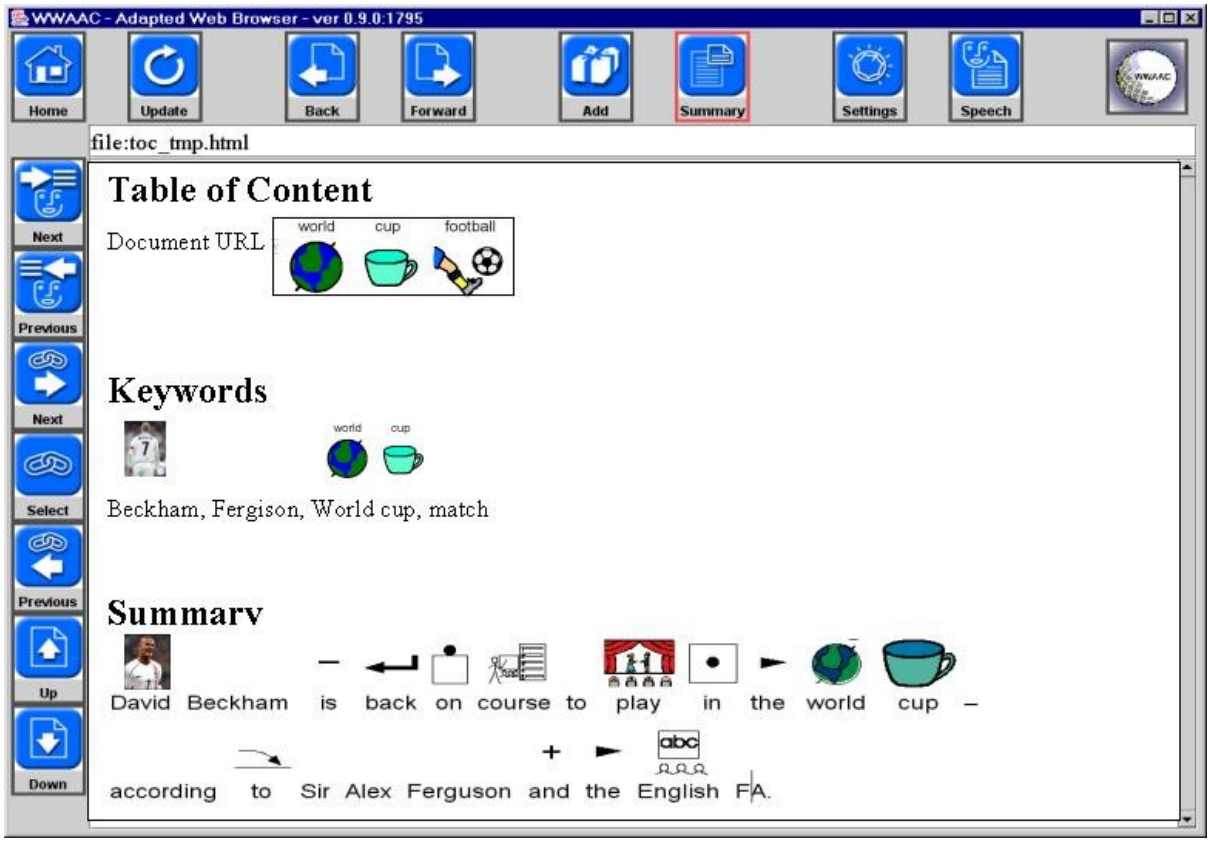
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Home
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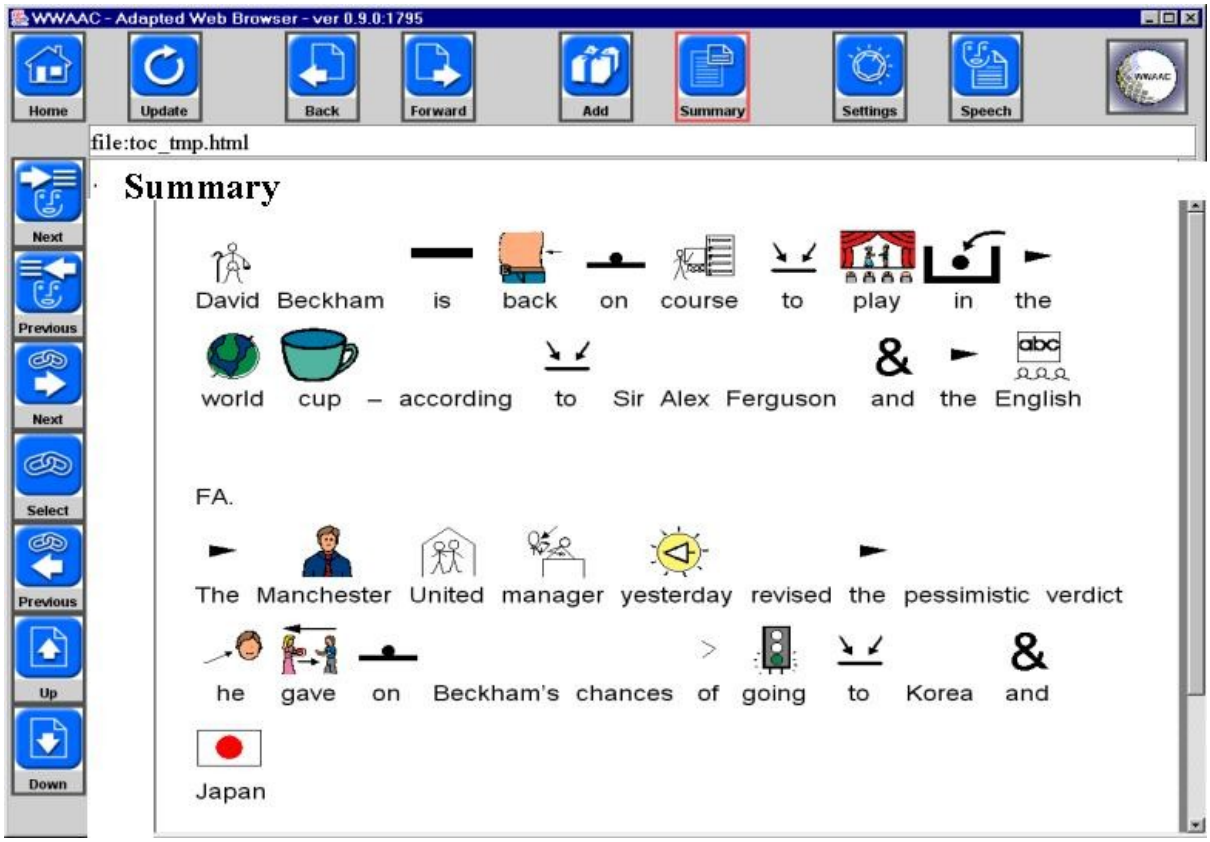
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Add
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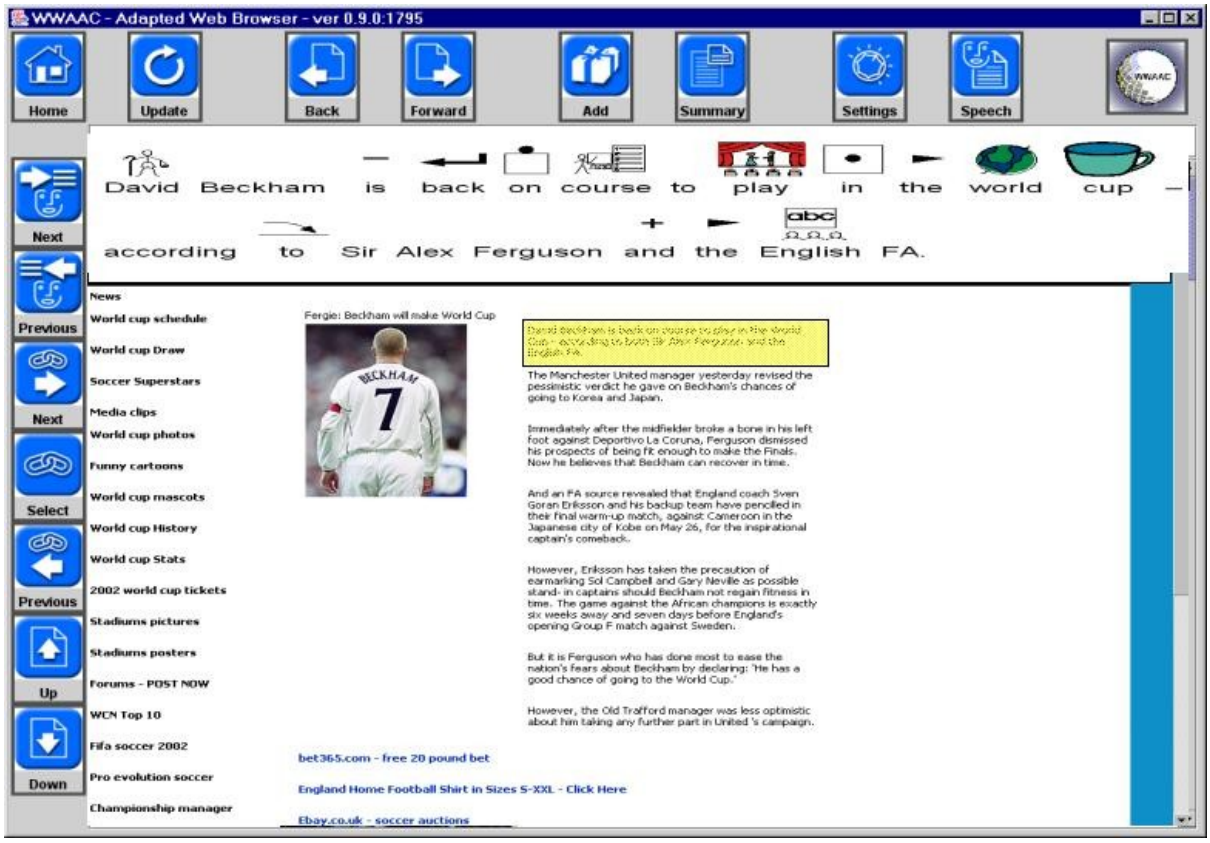
Japan


WWAAC - Adapted Web Browser - ver 0.9.0:1795
Home
Update
Back
Forward
Add
Summary
Settings
Speech
Next
Previous
Next
Select
Previous
Up
Down
David Beckham is back on course to play in the world cup - according to Sir Alex Ferguson and the English FA.
News
World cup schedule
World cup Draw
Soccer Superstars
Media clips
World cup photos
Funny cartoons
World cup mascots
World cup History
World cup Stats
2002 world cup tickets
Stadiums pictures
Stadiums posters
Forums - POST NOW
WCN Top 10
Fifa soccer 2002
Pro evolution soccer
Championship manager
Fergie: Beckham will make World Cup
The Manchester United manager yesterday revised the pessimistic verdict he gave on Beckham's chances of going to Korea and Japan.
Immediately after the midfielder broke a bone in his left foot against Deportivo La Coruna, Ferguson dismissed his prospects of being fit enough to make the Finals. Now he believes that Beckham can recover in time.
And an FA source revealed that England coach Sven Goran Eriksson and his backup team have penciled in their final warm-up match, against Cameroon in the Japanese city of Kobe on May 26, for the inspirational captain's comeback.
However, Eriksson has taken the precaution of earmarking Sol Campbell and Gary Neville as possible stand- in captains should Beckham not regain fitness in time. The game against the African champions is exactly six weeks away and seven days before England's opening Group F match against Sweden.
But it is Ferguson who has done most to ease the nation's fears about Beckham by declaring: 'He has a good chance of going to the World Cup.'
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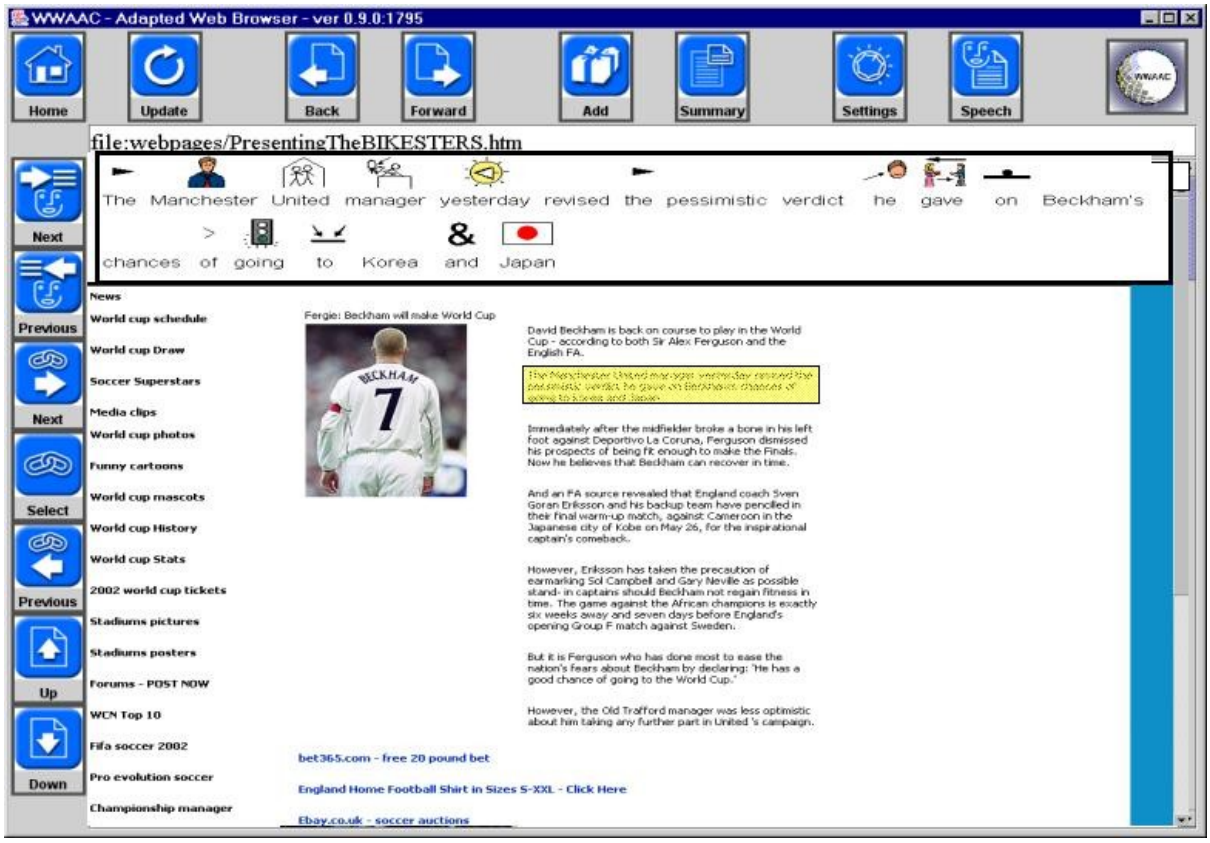
WWAAC - Adapted Web Browser - ver 0.9.0:1795
Home
Update
Back
Forward
Add
Summary
Settings
Speech
file:webpages/PresentingTheBIKESTERS.htm
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Previous
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Down
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APPENDIX 2: SAMPLE COMPLETED USAGE SCENARIO – ALPHA BROWSER

Users worked through a number of usage scenarios, and notes were taken on the evaluator's checklist (see Evaluation Plan, Appendix C), indicating whether help was needed, whether the task could be completed, and any specific problems or comments. These results have been integrated under the appropriate headings in this report, and an example of the raw data from the UK is provided below:

Choose a favourite web site and to go it.

Since User K was able to use the mouse, this was the preferred method of selection. The graphics on the Favourites page made this a simple task, and he did not require any assistance.

Scroll/move through the page.

He was able to use the scroll bar to move through the page, but he suggested that someone with a tremor might have problems with this and would find the scroll up/down button very helpful.

Start at the top of the page and read some text.

User needed to be reminded to select the Next paragraph button and preferred to click on the paragraph itself to read. It was necessary to increase the size of the text, as the user has a visual impairment. Beta version of the software needs an easy facility to change the size and colour of the text.

Read the same paragraph again.

Now read some more text.

User needed guidance in re-reading the paragraph and then again in reading the previous paragraph again. Low reading skills meant that he needed to be directed to the Next Paragraph button. The user regularly had difficulty in knowing whether to select the Next Paragraph or Previous Paragraph button.

Read the previous paragraph again.

See No. 4 above. On this particular page (www.derbycity.com), the system didn't recognise it as separate paragraphs, so on pressing Previous Paragraph, the reading started at the very top.

Read through just the links and then choose one of them, so that it will take you to another web site.

User preferred to use the mouse rather than the Next Link button.

Start at the top of the new page and read some text.

Again, the user preferred to use the mouse and needed to be reminded to use the Next Paragraph button.

Go to another part (frame) of the page (where Next Paragraph button won't work)

Before evaluating this aspect of the webpage, the concept of a Frame was described. Only one of the proposed sites had frames, and therefore this was demonstrated for the first time during the 1 to 1 evaluation phase. It was surprising to see that when the user clicked on the frame to activate it, he actually clicked onto the link, which took him to the next link rather than to the new frame. It was

suggested that when going to a new frame, the Next Frame button needs to first select the frame, and the next selection would take the user to the link.

Go back to the previous web site.

User completed this task without any difficulty.

Get a summary of the web page.

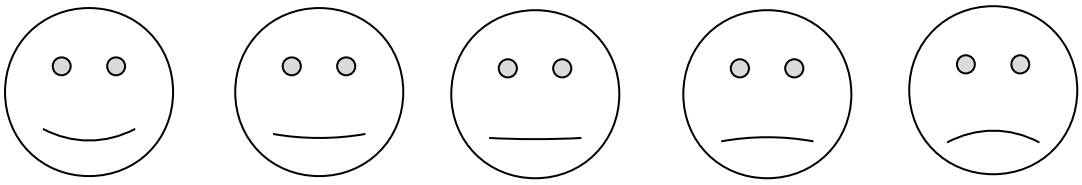
User not sure how to obtain the summary.

Read the summary of the web page.

User able to read through the links; however, system was highlighting 2 links at the same time, which proved to be a bit confusing.

APPENDIX 3: USER INTERVIEWS – ALPHA BROWSER

1. Do you like using this software?

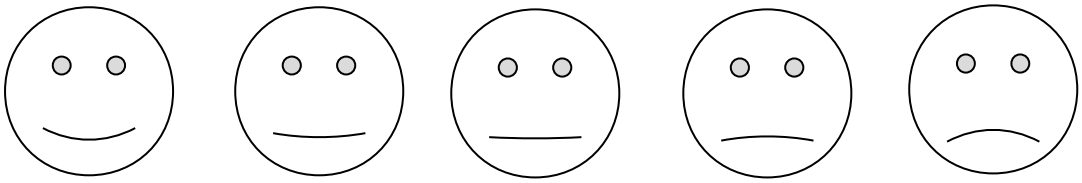


5 Very favourable | 4 Favourable | 3 Neutral | 2 Slightly negative | 1 Very negative

SE – User J said 5, and User P said 4
UK – User R said 5, User K said 4, User D said 3, User L said 5

Comments:
User K – Generally OK but fine tuning needed.
User L – Particularly liked the pictures on the Favourites page.

2. How easy was the software to use?



5 Very favourable | 4 Favourable | 3 Neutral | 2 Slightly negative | 1 Very negative

SE – User J said 5, and User P said 4.
UK – User R said 5, user K said 4, User D said 3, User L said 5.

Comments:
SE –

P: A little difficult, where you need to read, e.g. under “Settings”.

A bit hard to understand the speech synthesiser, but easier when slowed down.

UK – User K thought the icons could be clearer, e.g. stop sign for stop.

UK – User L found that the large pictures on the Favourites Page made it easier for him.

3. What things do you like about it?
SE –
J: The possibility to have my own symbol system/chart integrated in the software.
P: The buttons were easy to use, when I had learnt to recognise/know them.
That the voice is different when it tells you there is a link, so you understand that you can go further from it.
J+P: The speech – to hear.

UK –
Using the Talking Mats approach, User R rated the
Favourites Page: Favourable/Good (4)
Moving between pages, Back/Forward: Great/Very favourable (5)
Speech Support: Great/Very favourable (5)

UK –
Using the Talking Mats approach User D rated the
Favourites Page: Great (5)
Summary Page: Good (4)
Switch Access: Great (5)
Speech Support: Great (5)
Scrolling: Good (4)

UK – User K liked the speaking website

UK – User L liked everything, especially the favourites, the summary button, and the buttons for scrolling. Also he thought the speech output is good.

4. What things do you dislike about it?
SE –
J: Too complicated to change the rate of speech.
P: The reading by the speech synthesiser when searching by e.g. Google. It reads addresses and stuff you don't understand.
The speech sounds too computerized.

UK –
Using the Talking Mats approach, User R rated the
Using links: OK/neutral

Highlighting text: OK
Scrolling on a page: OK
Switch Access: OK
Looks (interface): OK
Things that can make it better: No comment.

UK –
Using the Talking Mats approach User D rated the
Looks: OK (3)
Highlighting text: OK (3)
Moving between pages: OK (3)
Using links: OK (3)

UK – User K too many keypresses for navigation (links).

UK – User L Slow to use link buttons. Found it a problem using Next Link when he was reading through a sentence or paragraph.

5. Are there any improvements we should make?

SE –

J: A button for adding favourites.

Different coloured buttons for different functions.

J+P: Symbols on the buttons “Summary” and “Frame”

6. Any other comments:
SE –
J: I would be happy to go on testing the browser.
I would like to be able to get access to my bliss symbols in the software (they were not accessible this time)
P: I will do better the more used to the software I get.

APPENDIX 4: DISCUSSIONS WITH EXPERTS/FACILITATORS – ALPHA BROWSER

SE: 2 facilitators participating in the workshop.

UK: 1 facilitator, participating in both workshops (2 end-users in each).

Do you believe that this software promotes independence for AAC users?

SE – Both facilitators answered yes, one of them with emphasis. Otherwise the user has to depend on somebody reading the text when he is visiting new sites on the Internet (or sites he doesn't know rather well). With this browser he could be able to go to new sites by himself.
UK – Yes, thoroughly.

Do you think that it has sufficient functionality to support them?

SE – Yes. The most important feature is to have the speech synthesizer.

UK – Yes. However, User R has recently changed language packages, and this presents a difficulty. It raises the question as to whether we want to have a minimum level of scanning software in the Browser. It was suggested that the best option is to be able to turn the scanning interface on and off so that you can use your own scanning interface if you want and hide the buttons on the software.

Do you think that users have been able to operate the software effectively?

SE – Yes. There haven't been any crash downs.
UK – evident by the speed by which User K was able to pick it up. Using a scanning interface (two switches) User R really needed more time to get used to it, and just when she started to get the hang of it, she was getting very tired and it was time to go home.

Do you think that the effort needed to operate the software has been acceptable for

users?

SE – Yes. (However, neither of these two users have severe difficulties in accessing their computers).
UK – Since User K cannot read the text, this system was great for him, and he was really 'getting into it.' Compared to what other software is available, this was also great for User R.

Do you think that the software is easy for users to operate?

SE – Yes.
- There are many opportunities in the software and he will need more training before he is able to use all of the features.
- There are nothing-dangerous happening when they click a button. It is a nice feature that the browser warns when a pop-up site is opened.

UK – In moving through a long list of links, there should be a facility to jump through a number of them at a time to speed up access.

Are there any aspects of the software that are likely to be confusing for users?

SE – Using 'Settings', there is a risk of making changes not meant to be. It is not possible to have the text in the dialogue squares spoken with the synthesiser. (The user wanted to lessen the speed of the speech, which required a rather deep dive into the settings, which are not properly designed for end user access. The comment implies a suggestion that settings – at least those that are available to and intended for the end user – should be supported by speech?! The speech rate is definitely a setting that should be easily available to the end user. Another thing that came up during the session – currently not supported – was the need to easily change the speech support from one language to another – perhaps semi-automatic.
UK – The terminology and icons on the buttons have caused some confusion for the users, e.g., Link, Page Up and Page Down. Also It is clear, however, that the system shouldn't stray too far from commonly used terms, but more work is needed here.
The Print icon is also not clear. It was suggested that we need a default set of icons but with the facility to import your own. The Speech icon could also be improved, e.g., by using a mouth with something inside it.
It was suggested that buttons could be colour-coded to denote types of functionality, e.g. Scroll Up and Scroll Down.

Do you consider the software to be a better option than available alternatives?

SE – Yes, absolutely. User P has been asking for software like this for a long time.

UK – Not aware of alternatives, and he considered it better than the standard software.

Are there any aspects of the software that you consider are frustrating to use?

SE – Settings

What additional features are needed to improve the software?

SE -

If the user doesn't understand a word, it would be nice to be able to mark the word with a bookmark and have it explained by somebody later.

When clicking the right mouse button, it should also read the text of the buttons in the browser

Possibility to choose between different sets of buttons, to make "his own" layout

An easier way to add a favorite (including a picture)

Do you think that users would continue to use this software if given the opportunity?

SE – Yes – with no doubt
UK – Each user said they would like to use the software again and to see the improvements which have been made following their evaluations.

Do you think that there is a market for this software?

SE –
For User J: Yes, for many people with disabilities.
For User P: I think so.

General Suggestions:

UK – It was suggested that a finite number of links could be given as a guideline for web design.

If you are using your mouse as a navigation tool, if you want to speak the link you need to make a distinction between selecting and reading.

It was suggested that there be some way of marking the beginning and the end of the text you wish to read, with a Stop or Pause button.

It was suggested that the Next Frame button and the Summary button should be with the ‘within page’ buttons (not at the top with the page navigation buttons).

It was also suggested that there could be a Dictionary/Thesaurus button to aid comprehension.

APPENDIX 5: USER PROFILES – ALPHA BROWSER

Please note that the user profile for one of the UK end-users was not returned. Therefore, this summary refers to N = 6

Country	M/F	Age	Impairment	Use of the Internet	Input device to PC	AAC system*	Internet Access
NL	F	29	Spastic quadriplegia	At home	Keyboard/mouse	Wizard/PCS	+/-
SE	M	?	Cerebral palsy, poor fine motor control, walks	At home/ school	Keyguard/ joystick	Blissboard/ handsigns	Supported
	M	?	Cerebral palsy, severe mobility disorders, dependent on electric wheelchair	At home	Trackerball	Blisschart with unfamiliar people, otherwise speaking	Supported
UK	M	18	Cerebral palsy, Dyplegia	At college	Keyboard/mouse	--	Supported
	M	19	Cerebral palsy	At college	Keyboard/mouse	--	Supported
	F	22	Cerebral palsy	No use	One switch (using hand through gross arm movement)	Pathfinder (32 single press), has a symbol 'About me' communication book	Supported
	M				Two switches		

Number of years with communication difficulties: 4 from Birth, 2 no information

PHYSICAL ASPECTS

Vision

Normal vision	5
Restricted visual field	
Corrected vision (glasses)	1
Poor visual acuity	

Hearing

Normal hearing	6
Partial hearing loss	
Severe hearing loss	
Corrected hearing (aided)	

Oculo-motor

Scans in all directions	3
Horizontal /vertical best	1
Difficulty with all directions	
No information	2

EXPRESSIVE COMMUNICATION

Yes / No strategies

Yes – Nods his head, facial expression
Speaks unintelligibly for unfamiliar people
Facial expression, gesture, verbal 'noises'

No – Using aids as Wizard, Communication book etc.
Shakes his head, facial expression
Speaks unintelligibly for unfamiliar people

In the context of a conversation with a familiar person in an institutional setting, the AAC user typically combines:

None	
1 symbol	
2 symbols	2
3 symbols	
4 symbols	
> 4 symbols	2

One of the users who typically combines 2 symbols is starting to learn to use more than 2 symbols and can also make herself understood clearly to her mother.

Grammar

In the context of a conversation with a familiar person in an institutional setting, the AAC user is typically:

Not using grammatical markers (in Bliss)	1
Using AAC system(s)/device(s) to mark aspects of grammar	
Using other non-verbal means (e.g. gesture) to mark aspects of grammar	2
No reply	1
Not Relevant	2

LANGUAGE UNDERSTANDING & COGNITIVE ABILITIES

Receptive language abilities sufficient to understand discussion concerning strengths and weaknesses of technology

6

Cognitive abilities such that they can think about, and understand, abstract concepts such as *email*, and *discussion fora*

3

2 no reply, and not sure if this meant not sufficient cognitive abilities to understand the concepts or that the facilitator did not know (which is unlikely). 1 answered 'doubtful'.

LITERACY

Preliterate – Limited use of symbols and pictures only	5
Limited – A basic vocabulary of a few hundred words and some basic spelling skills	1
Fluent – A vocabulary in excess of a thousand, and including symbol embellishment / use of grammar	

APPENDIX 6: USER PROFILES – LINGUISTIC MODULE PILOT

User 1:

User: …User 1

Gender ……Male…….

Location: ……Sweden…….

Date of Birth …….
Description of disability: …
CP , severe mobility disorder, uses electric wheelchair……
……..
Number of years with communication difficulties ……
All life……..

PHYSICAL ASPECTS

Vision

Normal vision	X	Comments: …….
Restricted visual field		……..
Corrected vision (glasses)		
Poor visual acuity		

Hearing

Normal hearing	X	Comments: …….
Partial hearing loss		……..
Severe hearing loss		
Corrected hearing (aided)		

Oculo-motor

Scans in all directions		Comments: …We have no explicit information about this…….
Horizontal /vertical best		
Difficulty with all directions		……..

Computer Access

Touch screen			Comments: …….
Keyboard -	standard		
	keyguard		……..
	modified		……..
	concept		
Pointer -	standard		……..
	Modif'd mouse		……..
	trackerball	X	
	joystick		
	other		
Voice input			
One switch			
Two switches			(Part of body used) …… ……

Independence in computer access

Access achieved independently	X
Access achieved with support	

EXPRESSIVE COMMUNICATION

What strategies are used for expressing Yes / No?

Yes ……speaks unintelligibly for unfamiliar people ……

No ……same as for yes……

Symbol systems/sets used …bliss (sometimes) …… ……

Communication aids used ……blisschart with unfamiliar people, otherwise speaking ……..

In the context of a conversation with a familiar person in an institutional setting, the AAC user typically combines:

None		Comments: …….
1 symbol		
2 symbols		……..
3 symbols		
4 symbols		
> 4 symbols	X	

Grammar

In the context of a conversation with a familiar person in an institutional setting, the AAC user is typically:

Not using grammatical markers - in bliss	X
Using AAC system(s)/device(s) to mark aspects of grammar	
Using other non-verbal means (e.g. gesture) to mark aspects of grammar	

LANGUAGE UNDERSTANDING & COGNITIVE ABILITIES

Receptive language abilities sufficient to understand discussion concerning strengths and weaknesses of technology

X

Cognitive abilities such that they can think about, and understand, abstract concepts such as *email*, and *discussion fora*

X

LITERACY

Preliterate – Limited use of symbols and pictures only	X
Limited – A basic vocabulary of a few hundred words and some basic spelling skills	
Fluent – A vocabulary in excess of a thousand, and including symbol embellishment / use of grammar	

CURRENT USE OF INTERNET SERVICES

Current use of Internet Services	Tick as appropriate
No use	
Used at home	X
Used at school, work, day care centre, etc.	
Other, please indicate:	

Independence in Internet access

Access achieved independently	
Access achieved with support	

User 2:

User: …User 2……

Gender ……male…….

Location: ……Sweden…….

Date of Birth …….
Description of disability: …Cp, poor fine motor control, walks
……..
Number of years with communication difficulties ……all life ……..

PHYSICAL ASPECTS

Vision

Normal vision	X	Comments: …….
Restricted visual field		……..
Corrected vision (glasses)		
Poor visual acuity		

Hearing

Normal hearing	X	Comments: …….
Partial hearing loss		……..
Severe hearing loss		
Corrected hearing (aided)		

Oculo-motor

Scans in all directions	X	Comments: …….
Horizontal /vertical best		……..
Difficulty with all directions		

Computer Access

Touch screen			Comments: ……
Keyboard -	standard		
	keyguard	X	……..
	modified		……..
	concept		
Pointer -	standard		……..
	Modif'd mouse		……..
	trackerball		
	joystick	X	
	other		
Voice input			
One switch			
Two switches			(Part of body used) …… ……

Independence in computer access

Access achieved independently	X
Access achieved with support	

EXPRESSIVE COMMUNICATION

What strategies are used for expressing Yes / No?

Yes …- nods his head, facial expression …… ……

No …- shakes his head, facial expression …… ……

Symbol systems/sets used ……bliss, handsigns

……

Communication aids used …blissboard

……..

In the context of a conversation with a familiar person in an institutional setting, the AAC user typically combines:

None	
1 symbol	
2 symbols	
3 symbols	
4 symbols	
> 4 symbols	X

Comments: ……

……..

Grammar

In the context of a conversation with a familiar person in an institutional setting, the AAC user is typically:

Not using grammatical markers	
Using AAC system(s)/device(s) to mark aspects of grammar	
Using other non-verbal means (e.g. gesture) to mark aspects of grammar	X

LANGUAGE UNDERSTANDING & COGNITIVE ABILITIES

Receptive language abilities sufficient to understand discussion concerning strengths and weaknesses of technology

X

Cognitive abilities such that they can think about, and understand, abstract concepts such as *email*, and *discussion fora*

X

LITERACY

Preliterate – Limited use of symbols and pictures only	X
Limited – A basic vocabulary of a few hundred words and some basic spelling skills	
Fluent – A vocabulary in excess of a thousand, and including symbol embellishment / use of grammar	

CURRENT USE OF INTERNET SERVICES

Current use of Internet Services	Tick as appropriate
No use	
Used at home	X
Used at school, work, day care centre, etc.	X
Other, please indicate:	

Independence in Internet access

Access achieved independently	
Access achieved with support	

APPENDIX 7: RESPONSES TO AD HOC JUDGEMENT TASKS – LINGUISTIC MODULE PILOT

Target	Response User A	Response User B
Dog (N)		
Correct answer		
Cat (N)	Cat	Cat
Distractor		
Run (V)		

Target	Response User A	Response User B
Bird (N)		
Correct answer		
Fish (N)	Fish	
Distractor		
Fly (V)		~~Fly~~

Target	Response User A	Response User B
Laugh (V)		
Correct answer		
Jump (V)		
Distractor		
Glad (Adj)	~~Glad~~	~~Glad~~

Target	Response User A	Response User B
The boy laughs (NP V)		
Correct answer		
The girl writes (NP V)		
Distractor		
The boy is happy (NP V Adj)	~~The boy is happy~~	~~The boy is happy~~

Target	Response User A	Response User B
The dog eats food		

(NP V NP)		
Correct answer		
The cat drinks milk (NP V NP)	The cat drinks milk	
Distractor		
The dog gets full (NP V Adj)		~~The dog gets full~~

Target	**Response User A**	**Response User B**
What do you? (What are you doing?) (QW V NP V)		
Correct answer		
Who is that? (QW V NP V)	Who is that?	Who is that?
Distractor		
I am jumping (NP VP)		

.

APPENDIX 8: USER INTERVIEWS - BETA BROWSER

DURING THE EVALUATION

Speech Synthesiser

What did you think of the speech support?

1 2 3 4 5

Country	User 1	User 2	User 3	User 4
Holland	2	1	3	
Sweden	2	2	1	1
Denmark	1	1	1	
UK	1	1	1	4
Finland	1	1	2	

Further options:

Opinion of the outline around the text
Dutch - User 1 said Very good

Sweden – User 2 said OK. User thought it was very good.

Denmark – User 1, 2 and 3 found it very good.

UK – User 1 found it very good. User 4 would like the line around the box to be thinner.

Experience of using the next / previous buttons
Dutch - User 1 said Useful, user 2 said very easy

Sweden – User 1 did not use these buttons. User 2 and 4 thought the buttons were good. User 3 was OK with these buttons.

Denmark – User 1, 2 and 3 found it very good.

UK – User 1 found it very good.

Experience of changing how much it reads in one go
Dutch - User 1 said Could use it, choice is OK

Sweden - User 1 thought it was OK. User 2 thought this facility was good. User 4 thought this was OK.

Denmark – User 2 and 3 found it very good.

UK – User 1 found it very good.

Experience of altering the speed
Sweden – User 1 and 4 were OK with this. User 2 was good at this, nice to be able to change when needed (if the words are hard to understand it´s a good feature to hear them one by one)

Denmark – User 3 found it very good but needs feedback

UK – User 1 found it very good.

Experience of altering the volume
Dutch - user 2 did this with loud speaker

Sweden – User 2 had a good experience with this function and user 4 had a very good experience with this.

UK – User 1 found it very good.

Any comments / suggestions about the speech support?

Dutch – Woman's voice is very important for User 1, from time to time stuttering. User 2 thinks it is good to understand. His family is very enthusiastic about speech output in general, but not that much about quality

Sweden – User 2 Good with different colour on the buttons for altering speed/volume.
If the words are hard to understand it's a good feature to hear them one by one.
User 4, It's good to be able to alter between word/sentence/paragraph. If something is important you can listen more intensively. Good to be able to repeat.

Denmark – User 1, reading the text using the next and previous buttons took some time to get used to the scanning and eventually started working. User 2 was happy with read next but did not see the use for read previous, he would rather point to

sentence on screen. It would be better if automatic scrolling started a little earlier so you can always see the next sentence/paragraph. User 3, it would be perfect if you could hear a test sentence every time you press the button to alter the speed. The graphics did not make much sense to User 3, User three was very good with the scanning which helped.

UK – On BBC site the speech synthesiser read out the drop down menus which were confusing. User 1 was very good with this. User 3 was able to read the writing himself so didn't need it to read aloud but he wouldn't like to turn the speech synthesiser off.

Finland – For user 2 all the buttons for speech were on the same row and should scan freely like in assistant. For user 3 it was mainly good but the locations of the buttons around the screen needed for configuring speech weren't the most logical. User 3 usually uses Mikropuhe which he prefers because of the quality of voice.

Using Links

What did you think about exploring links using the browser's buttons?

1 2 3 4 5

Country	User 1	User 2	User 3	User 4
Holland	3	Could choose directly	5	
Sweden	3	2	1	1
Denmark	1	1	1	
UK	1	Not used*	2	2
Finland	1	1	1	

** This user had difficulties with switch*

Further options:

Opinion of the 'skip 5' button
Sweden – user 2 OK, user 3 made good use of this button. User 4 made very good use of this button.

Denmark – user 1 and 3 made excellent use of it, it was great as it saved lots of clicks.

UK – User 1 and 4 did find this useful.

Finland – For user 3 this was confusing at first as it didn't always work as expected.

Opinion of the voice saying "link" or the playing of a sound when a link encountered

Sweden – User 1 thought it was OK. User 2 did not like the sound. With user 3 the sound did not work.

Denmark – User 3 found this very useful.

UK – The "ping" sound annoyed user 1.

Experience of going to a link
Sweden – User 1, 2 and 4 thought it was OK. User 3 had good experience of going to links.

Denmark - User 3 found this useful.

Any comments / suggestions about using links?
Dutch – Less important for user 1 although she did use this button

Sweden - If there are pictures it is easier to click directly in the picture (evaluator's comment).

Denmark – User 1 was very excited about reading text and following a link. User 2 was very happy with the "ping" sound, it was a good indication of a link in the text. For use 3 the whole concept of a "link" was a bit difficult to handle, his facilitator said it was probably because he likes to know how things work. Simply telling him that "a link takes you somewhere else" or some other page was not good enough. When the idea was accepted it worked fine except the "graphical link" which was confusing (a picture link with no ALT tag).

UK – User 1 found the BBC site very useful as he could use the next link button to skip to the main content. He could not close error pop up messages which was annoying. As user 1 found the "ping" sound annoying the researchers changed it to a sound of a person saying "link" which was better. User 3 was bored when he was asked to complete this task he would have rather talked about sports!

Finland – User 1 found hearing the link sound useful. User 2 found it useful. For user 3 the links worked well but pop ups were a problem.

Favourites

A. What did you think of the favourites page?

1 2 3 4 5

Country	User 1	User 2	User 3	User 4
Holland	1	1	1	
Sweden	1	2	2	3
Denmark	1	1	1	
UK	1	2	1	3
Finland	2	1	1	

B. What did you think of adding a site to the favourites page?

1 2 3 4 5

Country	User 1	User 2	User 3	User 4
Holland	2	1	1	
Sweden	1	3	1	1
Denmark	1	2	1	
UK	2	Not used*	2	Not used
Finland	2	1	1	

Further options:

Opinion of the picture of the new site
Dutch – User 1 said important, user 2 said that he did not find a problem with the picture and different size of the frames

Sweden – User 1, 2 and 3 thought it was good. User 4 thought it was very good.

Denmark – User 1 thought the picture was OK.

UK – User 1 preferred a big picture compared to a small one.

Finland – User 1 the address line could be bigger and/or elsewhere.

Experience of using the favourites page
Dutch user 1 said OK

Sweden user 1 said OK and user 2 and 3 thought it was good. User 4 thought it was very good.

UK – User 1 had a very good experience and successfully added pages to his favourites.

Any comments / suggestions about the favourites page?
Dutch – User 1, this page is important for her, but she can do some typing herself, she doesn't want to forget how to type, so will use both functions.
This user thinks it is important to have a nice picture, and not a picture of the whole page in the button. To fill this JPG file by settings button is too difficult to do on her own, but she would like to do it. She saves her own favourites when found. User 2 - Still it is very hard to find good pages!!!

Sweden – User 2, a better icon on button for adding new favourite. It would be very nice to choose your own picture for a site. It is bad that the "remove from favourite page" doesn't work.

Denmark – It's not easy to recognize the pages from the thumbnails. Need larger text under thumbnails. For all users it was difficult to recognise a page from the thumbnail, would like to choose his own picture with a click on the page.

UK – for user 1 and 4 it was important to have a large picture of the site that was added to his favourites rather than a thumbnail of the web page.

Finland – User 3, the address line should be bigger and the text was too small.

4. Summary

What did you think of the summary page?

1 2 3 4 5

Country	User 1	User 2	User 3	User 4
Holland	3	Not used	Not used	
Sweden	3	2	4	3
Denmark	Not used	Not used	Not used	
UK	1	Not used	Not used	5
Finland	1	1	1	

Further options:

Whether summary aided understanding of the content of the page
Dutch – not now for user 1

Sweden – user 1 and 3 and 4 said good. For user 2 the summary page aided understanding only sometimes.

UK – For user 4 the summary page did not aid understanding.

Whether summary useful for exploring the page
Sweden – For user 2 and 4 the summary page was useful. For user 3 the summary was not useful at all for exploring the page.

Any comments / suggestions about the summary page?
Dutch – User 1, Could be useful, but we did not find pages with a good summary possibility and then after choosing the link in the summary one comes back in the page itself!

Sweden – User 4 missed the pictures (we explain that it's not supposed to be pictures).

UK – User 1 found it useful to hear the description of the page, a summary description was not available on all the websites.

Finland – User 1 found it useful as graphics give too much information and the user is used to a text-based interface. User 2 prefers pictures. For user 3 the summary page was a fast way to look at an overview of a page.

Entering Information Online

What did you think about entering information on the search engine?

1 2 3 4 5

Country	User 1	User 2	User 3	User 4
Holland	3	Did not use	2	
Sweden	1	2	1	1
Denmark	2	1	5	
UK	1	Not used	3	4
Finland	2	1	1	

Any comments / suggestions about entering information on a web page?

Dutch – user 1 no difference to “normal” browser.

Dutch - Think about making a larger entering line and/of with the possibility to change wrong typed words before placing the text in the information line (Comment from evaluator)

Sweden – user 4 found it very easy to enter text , but wants to try it more.

Denmark – User 1, tried a normal Google search with prepared words, the user could not handle the results of the search. Tried google’s picture searches with the same words and that worked. We need a “clear field” button so you don’t need to press delete 20 times to clear the last search data. User 2 used prepared words in selection set with good results, we also carried out a normal google search but the results of this search were too confusing. Entering information on the search engine proved to be too difficult for User 3.

UK – It would be easier if there was speech output on the selection sets. User 4 would be happier if the software “spoke” the word.

Finland – User 1 found this function very useful but it did not always work logically, an example is why does the enter key take you forward instead of tab and submit not logical as usually use enter. Discover works better with search engine.

Exploring a Long Page

What did you think of the scroll (up/down) buttons?

1 2 3 4 5

Country	User 1	User 2	User 3	User 4
Holland	1	Uses scroll on mouse	Not used	
Sweden	2	3	3	Not used
Denmark	3	1	2	
UK	1	Not Used	Not used	Not Used
Finland	2	1	1	

Further options:

Opinion of having different types of scroll buttons (up, down, go to top, go to bottom)
Dutch – user 1 Very important

Sweden – User 2 OK with the different types of buttons.

UK – User 1 was fine in using the different type of buttons.

Any comments / suggestions about scrolling on a page?

Sweden – User 2 prefers to use the scroll bar instead, he thinks this is faster for him.

Denmark – User 1, found that there were too many buttons to scan through. User 2 couldn't hit the normal scroll bar on the touch screen so the buttons were handy, a wider scroll bar was also tried but the buttons were better. User 3 was fine, finished before the trainers finished telling him what to do.

Finland – For user 2, focus didn't stay on a place where the scanning stopped.

Frame Navigation

What did you think of moving the box around the screen (or the next frame feature)?

1 2 3 4 5

Country	User 1	User 2	User 3	User 4
Holland	5	Not used	Not used	
Sweden	3	2	3	Not used
Denmark	5	2	Not used	
UK	Not used	Not Used	1	Not used
Finland	3	2	1	

Any comments / suggestions about moving between frames?

Dutch – user 1, doesn't work right, no experiences.

Denmark – Too confusing to navigate a page with too many empty frames. Works fine on simple pages. For user 2 it worked fine, the user was a touch screen user so it would have been better if the browser would just take clicks anywhere and not only in the current frame. It was confusing that on non frame pages he could just point anywhere on the screen but on a frame page he had to use "Next Frame" first.

Finland – User 1 found the concept difficult as she was not familiar with it. For user 2 the scanning seemed to work slower inside the frame than when moving from frame to frame, this was confusing. For user 3 this saved a lot of time but needs a concentrated mind.

Free Browsing

What did you think about using the browser to explore the Internet?

1 2 3 4 5

Country	User 1	User 2	User 3	User 4
Holland	2	No time	1	
Sweden	No time	No time	No time	No time
Denmark	1	No time	No time	
UK	No time	No time	No time	No time
Finland	No time	1	2	

Any comments / suggestions about exploring the Internet?

Dutch - user 1 feels confused, she thinks that she still must exercise to browse on the “normal” way, not to lose experience. User 2 enters the information now by overwriting texts. The favourite page is very helpful for him. User 3’s mother has not seen him this enthusiastic in a long time.

AFTER THE EVALUATION

Do you like the software?

1 2 3 4 5

Country	User 1	User 2	User 3	User 4
Holland	2	1	1	
Sweden	2	2	2	1
Denmark	2	2	1	
UK	1	1	3	1
Finland	1	4	2	

Any other comments or non-verbal information:

Dutch – user 1 Happy to use it, feels good for her that she can give useful information to the WWAAC team. User 2 liked the favourite page and speech output, looking forward to using the browser in the future. User 3 has found freedom, independence although with help, the only thing he can do alone at this moment
Sweden – User 2 found it hard in the beginning but now he recognizes it is easier.
Finland – for user 2 problems with scanning lowered the impression.

How easy was it to use the software?

1 2 3 4 5

Country	User 1	User 2	User 3	User 4
Holland	2	1	3	
Sweden	3	3	5	1
Denmark	4	1	1	
UK	1	4	1	2
Finland	1	5	1	

Any other comments or non-verbal information:
Dutch – user 1 Very easy, but user 1 is not the person to mention the best, she did use it independent after 15 minutes and helps me to program. User 2 and his mother are happy that the Internet is more accessible for him. User 3, It is very hard for him to use the software. When he is alone he has better control over his tension, the tension increases when people are looking. He wants to practice every day, he perspires a lot while working.
Sweden – User 2 found it hard in the beginning but now he recognizes it is easier. User 3 found it difficult to remember the buttons.
Denmark – user 1 found the scanning to be very hard work.
UK – User 2 found it very difficult to use her head mounted switch to select the correct buttons. This made using the software very difficult and tiring, repositioning the monitor and headrest helped a bit.
Finland – User 2 did not find the software as easy to use because he is so used to discover and its functionality.

What do you think of the pictures on the buttons?

1 2 3 4 5

Country	User 1	User 2	User 3	User 4

Holland	3	2	5	
Sweden	3	3	4	3
Denmark	2	2	5	
UK	1	2	3	4
Finland	1	3	1	

Any other comments or non-verbal information:

Dutch – user 1 Too many colours, too much printing, too much to see. User 2 can understand the pictures and he knows the function of the keys. User 3 thinks the buttons have bad contrast and are difficult to understand.
Sweden – User 2 found that some buttons were easy to understand while some were hard.
Denmark – user 3 could not understand the meaning from the graphics.
UK – User 4 would like to put her own pictures on the buttons, she found it difficult to see the difference between the buttons. The facilitator commented that it would be very useful for the users to be able to use their own symbol sets on the buttons as these are designed for AAC users.

What do you think of the layout of the buttons?

1 2 3 4 5

Country	User 1	User 2	User 3	User 4
Holland	3	2	5	
Sweden	2	3	5	3
Denmark	1	2	1	
UK	3	4	2	5
Finland	2	4	1	

Any other comments or non-verbal information:
Dutch – User 2 thinks it is clear but not beautiful also because of the colour blue. He doesn't read the text above. User 3 thinks the buttons are a bad contrast.
Sweden – User 3 found it difficult to reach all of the buttons with her head mouse. User 4 thought it may be better once the locations of the buttons are changed. A question confirming the saving of the locations of the buttons would be good with the closing of the software.
UK – user 1 would prefer if the buttons were all in rows along the bottom of the screen (similar to his communication aid). User 2 would like the buttons in the middle of the screen similar to her Dynavox communication aid and she would like

the buttons to go away after she has made the selection, ideally she would like to have the same interface as her Dynavox. User 4 had a similar opinion and would have liked two rows at the top of the screen similar to her communication aid.

How easy was it for you to select the buttons?

1 2 3 4 5

Country	User 1	User 2	User 3	User 4
Holland	1	1	3	
Sweden	1	2	2	1
Denmark	4	2	1	
UK	1	1	N/A	2
Finland	1	1	1	

Any other comments or non-verbal information:
Dutch – User 2 had very good motor control.
User 3 has only a few buttons, like speak, link, follow link, and some most important buttons in the horizontal row. We think his one function button doesn't work correctly, we will make an appointment with the supplier of this special foot button.

Denmark – User 1 found the scanning to be very hard work, one reason for this was that he has just started using scanning very recently and needs more training. For user 2 the meaning of the buttons was not clear to him from the graphics. User 3 was a very good scanner so selecting the buttons was fine.

UK – User 2 had a lot of difficulties in selecting the correct buttons to begin with, but this became easier after the positioning of the screen and headrest had been changed. It was easier to follow a red line around the buttons compared to the yellow line.

Finland – User 1 was using a head stick and knew where to point but using the head stick causes some limitations depending on the size of the screen.

Are there any things you especially like about the web browser?
Dutch – User 3 the speech output and independence.

Sweden – User 1 and 4 Speech output, user 2 speech synthesiser support.

Denmark – User 1 likes the speech support with frames around the spoken word/sentence.

Finland – User 1, 2 and 3 liked the speech output.

Are there any things you really dislike about the web browser?
Sweden – User 3, the possibility to visit sites you didn't want to visit.

Denmark – User 1 disliked the scanning in general.

Finland – User 1 found it difficult to differentiate between sentence/ word/ paragraph/ none. For user 2 the scanning does not work as well as the Discover switch. With user 3 opening the page links didn't always work properly.

Are there any improvements we should make? Yes ❒ No ❒

Please explain:
Dutch – User 1 more pages without faults, less problems with speech output, change layout colours and too much impression of buttons
Sweden – user 2 Link button needs a better Icon, better with word only. Concept coding would be a good feature. User 3 would prefer having another lay-out with buttons on the top instead. User 4 would like a big dialogue box when a site is added to the favourites "do you want to add this site to your favourites".
Denmark – User 1, invent a better search engine!
UK – User 3 would like the software to be quicker reading, wanted to be able to read the whole page then he won't need to keep scanning.
Finland – For user 1 rolling buttons should be moved where the function is, change the layout. For user 2 improve the scanning.

Would you like to use this software again?

Country	User 1	User 2	User 3	User 4
Holland	yes	yes	yes	
Sweden	maybe	yes	yes	yes
Denmark	yes	yes	yes	
UK	yes	yes	N/A	yes
Finland	yes	not sure	yes	

After using the software a few more times with someone helping you, could you imagine using this software on your own?

Country	User 1	User 2	User 3	User 4
Holland	yes, already can	yes	yes	
Sweden	maybe	yes	yes	yes
Denmark	no	yes	yes	
UK	yes	yes	N/A	no
Finland	yes	yes	yes, already can	

Any other comments:
Dutch – User 1 best functions are ; speech output and reading aloud of sentence, box around sentence to see where you are, scroll buttons and favourites page. User 3 had very good support of his parents. We could use some extra information when activating the button (compared to the Message Mate software, which gives a loud sound when the button is held down too long). I made a favourite page with too many sites (8 links to sites) and programmed too many buttons in two rows. First visit changed in easier rows, second visit less buttons programmed and only a few favourites. He needs more explanation of the buttons, will make some paper buttons for explaining e-mail. He needs a lot of time! It's worth it.
UK – User 2 mentioned that she would have preferred to having this sort of software at her primary school so she would be familiar with it and be able to use it more easily.

APPENDIX 9: USER INTERVIEWS - BETA EMAIL

DURING THE EVALUATION

Reading an incoming email

What did you think of reading a new email message?

1 2 3 4 5

Country	User 1	User 2	User 3	User 4
Holland	2			
Sweden	2	2	2	3
Denmark	1	1	1	
UK	1			
Finland	1	1	1	

Further options:

Experience of finding the message
Holland – User 1 found finding the message OK.

Sweden – User 2 & 3 found finding the message OK.

Denmark – User 2 and 3 had a very good experience of finding a message.

Opinion of the speech
Holland – User 1 very much perceives the need for a woman's voice

Sweden – User 1 and 3 and 4 liked the speech output. User 2 thought that it was good for the software to be able to read.

Denmark – User 1, 2 and 3 found the speech very good.

Experience of leaving the Inbox
Holland – User 1 found this OK.

Sweden – User 1 found this boring. User 3 did not like this at all. User 4 found this OK.

Denmark – User 1 found leaving the inbox very bad. User 3 found the experience of leaving the inbox very good

Any comments / suggestions about reading a new email message?

Sweden – User 3 experienced the wrong symbol in the name (girl S). User 3 needs to "hear" the symbols in the symbol set. User 4 would like to see mailbox at the same time as the mail. User 3 would also like information about who the sender is, he found it more difficult than the software that he is used to (Outlook Express).

Denmark – User 1 liked having an image of the sender and found reading messages fun. User 3 did not like the quality of the voice but liked the fact that the mail could be read to him. User 3 noticed that there was a difference in the button layout for reading text between the email and browser which was confusing.

UK – User 1 found it very useful having people's photographs who he had sent to, he found it easier to read line by line and wanted the speech rate to be slower and louder.

Finland – User 3 was a very experienced Outlook Express user and had no problems with WWAAC email.

Using the address book

What did you think of the address book?

1 2 3 4 5

Country	User 1	User 2	User 3	User 4
Holland	2			
Sweden	2	2	3	3

Denmark	1	1	1	
UK	1			
Finland	2	1	1	

Further options:

Experience of finding a person in the address book
Holland – User 1 found this OK, there was no need of speech output for this particular user.

Sweden – User 1, 3 and 4 were OK with this. User 2 had a good experience with finding somebody from their address book.

Denmark – User 1, 2 and 3 had a very good experience with this.

Opinion of the way the address book looks
Holland – User 1 and 3 found this OK, for this particular user there was no need to use photos.

Sweden – User 1 thought the address book was good but the photos were blurred. User 4 thought that the appearance of the address book was very good.

Denmark – User 1 and 2 thought that the address looked very good.

Any comments / suggestions about the address book?
Holland – Uses Bliss symbols for persons.

Sweden – Users may find it difficult to configure their address book themselves. User 4 who was an Outlook Express user would like some similar functions to outlook such as being able to send mail to more than one person, send a copy to someone, see the addressbook at the same time as other windows are open (i.e. the writing window). User 4 found it difficult to go back and forth a lot.
UK – User 1 would have liked a brighter colour round the photographs in the address book to make them more conspicuous. The visual focus was found to be too narrow and it was not possible to change its colour.

Finland – User 2 found this good and the graphics worked well.

Composing and Sending a new email message

What did you think about writing an email?

1 2 3 4 5

Country	User 1	User 2	User 3	User 4
Holland	1			
Sweden	2	2	1	1
Denmark	1	1	5	
UK	1			
Finland	1	3	1	

Further options:

Experience of sending the email
Holland – User 1 found it very easy. User 4 thought that it would be very good if it was possible to get access to your own symbols.

Denmark – User 1, 2 and 3 had a very good experience of sending an email.

UK – User 1 had a very good experience with sending an email.

Experience of 'exchange' / 'send & receive'
Holland – User 1 found this OK.

Sweden –User 3 was good with this function.

Denmark – User 1 and 3 had a very good experience with this.

UK – User 1 found it easy to use the exchange button.

Any comments / suggestions about writing an email message?
Holland – for user 1 the complexity of the email software could be safely increased.

Denmark – User 1 wrote the email from prepared keywords and phrases. The user found it hard work to write a message. User 2 found the reading of "connect",

"authenticating" and those things confusing at first but the researchers explained that "that's just how it is, ignore it" and after that he was fine with it.
With user 3 the scanning of the selection set did not work.

Finland – User 2 you have to use vocabulary which would have been easier with Discover.

Using the Sent Mailbox

What did you think about viewing sent messages?

1 2 3 4 5

Country	User 1	User 2	User 3	User 4
Holland	1			
Sweden	2	1	3	1
Denmark	1	2	1	
UK	1			
Finland	1	1	1	

Any comments / suggestions about viewing sent messages?
Holland – User 1 found this very easy.

Denmark – User 2 the checkmark to indicate "sent OK" was very popular. User 3 thought that it would be good for the software to remind you who you have already sent to.

UK – It would be useful if the picture of the recipient would be made bigger as well as the tick symbol. It would be useful if it was possible to read the subject of the sent messages.

Receiving New Mail

What did you think about receiving new mail?

1 2 3 4 5

Country	User 1	User 2	User 3	User 4
Holland	1			
Sweden	1	2	2	3
Denmark	1	2	1	
UK	Not used			
Finland	1	1	1	

Any comments / suggestions about receiving new mail?

Sweden – User 4 would like to know who sent him the message and when.

AFTER THE EVALUATION

Do you like using this software?

1 2 3 4 5

Country	User 1	User 2	User 3	User 4
Holland	1			
Sweden	1	1	4	3
Denmark	3	2	1	
UK	1			
Finland	1	1	1	

Any comments or non-verbal information:
Sweden – User 1 thought that a lot of thinking had gone behind the software. User 3 found the software difficult to use.
Denmark – User 1 would like more training with the software but would not like to be left alone with it.

How easy was it to use the software?

1 2 3 4 5

Country	User 1	User 2	User 3	User 4
Holland	1			
Sweden	4	2	5	3
Denmark	1	2	1	
UK	1			
Finland	3	1	1	

Any comments or non-verbal information:
Denmark – User 1 found it easy to use the software because there was someone to help.
Finland – User 1 needs more practice, layout which changes is distracting, how to come back where you were earlier?

What do you think of the pictures on the buttons?

1 2 3 4 5

Country	User 1	User 2	User 3	User 4
Holland	3			
Sweden	2	2	3	3
Denmark	3	2	5	
UK	1			
Finland	3	1	1	

Any comments or non-verbal information:
Holland – user 1 found the buttons too complex, too many colours, printing etc.
Sweden – User 2 thought that the icons and pictures made it easier to use the software. User 4 found it hard to understand what the symbols represent.
Denmark – The user could not understand the meanings of the buttons from the graphics

Finland – For user 1 graphics in and out are too similar

What do you think of the layout of the buttons?

1 2 3 4 5

Country	User 1	User 2	User 3	User 4
Holland	3			
Sweden	2	2	4	3
Denmark	1	N/A	1	
UK	1			
Finland	2	1	1	

Any other comments or non-verbal information:
Sweden – User 3 thinks that it is difficult to reach the buttons

How easy was it for you to select the buttons?

1 2 3 4 5

Country	User 1	User 2	User 3	User 4
Holland	1			
Sweden	3	1	2	1
Denmark	4	1	1	
UK	2			
Finland	1	1	1	

Any comments or non-verbal information:
UK – It would be easier if instead of having to use selecting switch and moving switch to get in just using the moving switch when column is highlighted.

What did you think of the speech support?

1 2 3 4 5

Country	User 1	User 2	User 3	User 4
Holland	2			
Sweden	1	1	3	1
Denmark	1	2	1	
UK	3			
Finland	2	1	1	

Any comments or non-verbal information:
Holland – User 1 prefers a woman's voice, quality is less important. User 1 found the speech for reading mail useful but for writing mail she doesn't want to rely on the speech as she wants to get more practice with using letters.
Denmark – User 2 missed the framing of the spoken word which he had seen in the WWAAC browser. User 3 did not like the quality of the voice, apart from that the speech support was very useful.
UK – the user found the controls for the speech were very good but the voice was not so good, the speech support would be better with a different voice (i.e. Jane's voice).
Finland – With user 1 the voice support should be able to be switched off when going into the inbox or outbox.
Are there any things you especially like about the email software?
Sweden – User 2 found the speech synthesizer support whilst reading the email very useful. User 3 was very excited when a new email was received and read. User 4 really liked the address book with the software.
Finland – User 1 liked the vocabulary, addressbook and speech support. User 2 liked the fact that they could send emails using Bliss.
Are there any things you really dislike about the email software?
Sweden – User 4 did not like not having access to the more advanced functions of the email software including; attaching files, can only send mail to one person at a time, the layout being able to see more at a time.
Finland – User 1 dislikes the design of the speak button, a picture of the mouth would be enough. With user 2 the scanning wasn't reliable and the configuration wasn't easy.
Are there any improvements we should make? Yes ❒ No ❒
Please explain:
Holland – User 1 would like a speech button to choose if you want to use speech "yes or no".

Sweden – User 2 thought that the software could be improved with clearer icons on the buttons as the current icons are sometimes hard to understand. User 3 would like better icons and the speech synthesizer to be more reliable. User 4 would like it to be possible to be able to make groups in the address book.
Finland – User 1, buttons for rolling text are missing.

Would you like to use this software again?

Country	User 1	User 2	User 3	User 4
Holland	Yes			
Sweden	Maybe	Yes	Yes	Not sure
Denmark	Yes	Yes	Yes	
UK	Yes			
Finland	Yes	Yes	Yes	

After using the software a few more times with someone helping you, could you imagine using this software on your own?

Country	User 1	User 2	User 3	User 4
Holland	Yes already can			
Sweden	Yes	Yes	No	Yes
Denmark	Yes	Yes	No	
UK	Yes			
Finland	Yes	Yes	Yes already can	

Any other comments:
Holland – User 1 likes to be independent and use different kind of email program.
Denmark – User 1 found that it was great fun exchanging messages and he almost jumped out of his chair when he got a reply to his first message.
UK – User 1 is using “grid” on the Cameleon, it needs to be investigated whether this would be compatible with WWAAC.
Finland – With the email personal vocabulary is needed so somebody has to do the work.

APPENDIX 10: USER PROFILES – BETA BROWSER AND EMAIL

Country	M/F	Email (User No)	Browser (User No)	Age	Impairment	Use of the Internet	Input device to PC	AAC system*	Internet Access
NL	F	✓(1)	✓(1)	17	Diplegia	School	Keyboard/modified pointer	Bliss/Dubby	Independent
	M		✓(2)	18	Diplegia	Home and school	Keyboard/ trackerball	Bliss/ Bliss book, SFW DM	Independent
	M		✓(3)	26	Quadriplegia	No use	One switch (footbutton)	Bliss/ messagemate, blissbook	N/A
SE	M	✓(1)	✓(1)	21	Cerebral palsy, severe mobility disorder	School	Two switches	Bliss/ symbol chart	Supported
	M	✓(2)	✓(2)	36	Cerebral palsy, severe mobility disorder	Home	Trackerball	Blisschart with unfamiliar people, otherwise speaking	Independent
	F	✓(3)	✓(3)	14	Cerebral palsy, severe mobility disorder	Home and school	Head mouse	Bliss/ symbol charts	Supported
	M	✓(4)	✓(4)	19	Cerebral palsy, poor fine motor control	Home and school	Keyguard / joystick	Blissboard	Independent
UK	M		✓(1)	17	Cerebral palsy	No use	Joystick	PCS/ Pathfinder with LLL	N/A
	F		✓(2)	20	Cerebral palsy	No Use	One head switch, Handsoff or the grid	Dynasyms/ Dynavox	N/A
	M		✓(3)	15	Cerebral palsy	School	Big keys keyboard with key guard	Pathfinder, delta talker	Supported
	F		✓(4)	21	Cerebral Palsy	No use	One head mounted swtich	PCS, Chameleon	N/A
	F	✓(1)		19	Cerebral Palsy	No Use	One switch, Intelli Keyboard	PCS/ Chameleon with grid	N/A
FI	M	✓(1)	✓(1)	49	Cerebral Palsy	Home	Touchscreen , headstick	Bliss, Computer with speech synthesiser and SAPI	Supported
	M	✓(2)	✓(2)	41	Cerebral Palsy	Home	One switch (Discover)	Bliss, communication charts, Discover	Independent

	M	✓ (3)	✓(3)	46	Cerebral Palsy	Home	On screen Keyboard, Joystick	Bliss, Computer with speech synthesiser, symbol charts	Independent
DE	M	✓ (1)	✓(1)	18	Cerebral Palsy	School	One head switch	Bliss, Computer with Samtal software	Supported
	M	✓ (2)	✓(2)	46	Rigidity, Spasticity	School	Touch screen	PCS/ Dynamo speech device	Supported
	M	✓ (3)	✓(3)	20	Cerebral Palsy	No Use	One head switch	Bliss, Paper board	N/A

Number of years with communication difficulties: 17 from Birth
The following information was not provided for all users, but is recorded below where available.

PHYSICAL ASPECTS

Vision

Normal vision	14
Restricted visual field	
Corrected vision (glasses)	5
Poor visual acuity	

Hearing

Normal hearing	19
Partial hearing loss	
Severe hearing loss	
Corrected hearing (aided)	

Oculo-motor

Scans in all directions	16
Horizontal /vertical best	
Difficulty with all directions	2
No information	

EXPRESSIVE COMMUNICATION

Yes / No strategies

Yes – Speech, speech, Looking forward, speech, nods head, speech, speech, facial expression, facial expression plus bliss symbol, facial expression plus bliss symbol, head moves left, speech, speech, nods head, looks up, looks up, hand up, speech and nods head, speech and nods head

No – Speech, speech, Eyes looking up, speech, shakes head, speech, speech, facial expression, facial expression plus bliss symbol, facial expression plus bliss symbol, head moves right, speech, speech, speech, shakes head, shakes head, hand down, speech and shakes head, speech and shakes head

In the context of a conversation with a familiar person in an institutional setting, the AAC user typically combines:

None	1
1 symbol	2
2 symbols	3
3 symbols	
4 symbols	
> 4 symbols	11

Grammar

In the context of a conversation with a familiar person in an institutional setting, the AAC user is typically:

Not using grammatical markers (in Bliss)	6
Using AAC system(s)/device(s) to mark aspects of grammar	8
Using other non-verbal means (e.g. gesture) to mark aspects of grammar	1

LANGUAGE UNDERSTANDING & COGNITIVE ABILITIES

Receptive language abilities sufficient to understand discussion concerning strengths and weaknesses of technology

16

Cognitive abilities such that they can think about, and understand, abstract concepts such as *email*, and *discussion fora*

17

2 no reply, and not sure if this meant not sufficient cognitive abilities to understand the concepts or that the facilitator did not know (which is unlikely). 1 answered 'doubtful'.

LITERACY

Preliterate – Limited use of symbols and pictures only	3
Limited – A basic vocabulary of a few hundred words and some basic spelling skills	11
Fluent – A vocabulary in excess of a thousand, and including symbol embellishment / use of grammar	2

Current use of Internet Services	Tick as appropriate
No use	5
Used at home	7
Used at school, work, day care centre, etc.	9
Other, please indicate:	

Independence in Internet access

Access achieved independently	3
Access achieved with support	9

APPENDIX 11: USER PROFILES – LONGITUDINAL BROWSER & EMAIL

Country	M/F	Email (User No)	Browser (User No)	Age	Impairment	Use of the Internet	Input device to PC	AAC system*	Internet Access
UK	M		✓(1)	22	Quadriplegia	School	One head mounted switch	Dynamyte/PCS	Supported
	M		✓(2)	21	Cerebral Palsy	No Use	Two chin switches	Dynavox/PCS	Supported
	F	✓(3)	✓(3)	21	Cerebral Palsy	No use	One head mounted swtich	PCS, Chameleon	Supported
NL	F	✓(1)	✓(1)	17	Diplegia	School	Keyboard/modified pointer	Bliss/Dubby	Independent
	M	✓(2)	✓(2)	26	Quadriplegia	No use	One switch (footbutton)	Bliss/ messagemate, blissbook	N/A
	F	✓(3)	✓(3)	25	Quadriplegia	Home	Modified pointer	Wizars/Bliss	Supported
	M	✓(4)	✓(4)	11	Quadriplegia	Home	Standard	Wizard/PCS Bliss	Independent
	F	✓(5)	✓(5)	17	Tetraplegia	Home/School	Trackerball	Bliss/ symbol chart	Supported
SE	M	✓(1)	✓(1)	36	Cerebral palsy, severe mobility disorder	Home	Trackerball	Blisschart with unfamiliar people, otherwise speaking	Independent
	M	✓(2)	✓(2)	19	Cerebral palsy, poor fine motor control	Home and school	Keyguard / joystick	Blissboard	Independent
	M	✓(3)		21	Cerebral palsy, severe mobility disorder	School	Two switches	Bliss/ symbol chart	Supported

Number of years with communication difficulties: 11 from Birth (100%)
The following information was not provided for all users, but is recorded below where available.

PHYSICAL ASPECTS

Vision

Normal vision	9
Restricted visual field	
Corrected vision (glasses)	1
Poor visual acuity	

Hearing

Normal hearing	11
Partial hearing loss	
Severe hearing loss	
Corrected hearing (aided)	

Oculo-motor

Scans in all directions	9
Horizontal /vertical best	
Difficulty with all directions	1
No information	

EXPRESSIVE COMMUNICATION

Yes / No strategies

Yes – Speech, Looking Forward, Look up, speech, speech, look up, speech, speech and nods head, speech, speech and face expression, nods head and facial expression

No – Speech, Eyes looking up, Shake head, speech, speech, shake head, speech, speech and shakes head, speech, speech and face expression, shakes head and facial expression

In the context of a conversation with a familiar person in an institutional setting, the AAC user typically combines:

None	
1 symbol	
2 symbols	2
3 symbols	2
4 symbols	2
> 4 symbols	4

Grammar

In the context of a conversation with a familiar person in an institutional setting, the AAC user is typically:

Not using grammatical markers	5
Using AAC system(s)/device(s) to mark aspects of grammar	3
Using other non-verbal means (e.g. gesture) to mark aspects of grammar	1

LANGUAGE UNDERSTANDING & COGNITIVE ABILITIES

Receptive language abilities sufficient to understand discussion concerning strengths and weaknesses of technology

11

Cognitive abilities such that they can think about, and understand, abstract concepts such as *email*, and *discussion fora*

10

2 no reply, and not sure if this meant not sufficient cognitive abilities to understand the concepts or that the facilitator did not know (which is unlikely). 1 answered 'doubtful'.

LITERACY

Preliterate – Limited use of symbols and pictures only	4
Limited – A basic vocabulary of a few hundred words and some basic spelling skills	7
Fluent – A vocabulary in excess of a thousand, and including symbol embellishment / use of grammar	

Current use of Internet Services	Tick as appropriate
No use	2
Used at home	4
Used at school, work, day care centre, etc.	5
Other, please indicate:	

Independence in Internet access

Access achieved independently	1
Access achieved with support	3

APPENDIX 12: SAMPLE LOG FILE – LONGITUDINAL BROWSER & EMAIL

Log file for NL User 1 on 2 March 2004:

Back	1
Document complete	9
Home	1
Navigate	9
Next sentence	2
Set mode	1

APPENDIX 13: SENTENCES FOR TRAINING – LONGITUDINAL WSW

My name is xxx. (Ready-made phrase)

I am happy.
I am angry.
I am big.

I am happy.
A is wise.
The car is blue.
The food (tastes) is good.

I think.
I write.
I eat.
M. comes.
I. writes.

I want to write to A.
I will go to I.
I will explain to you.
I will go to the cinema.

Are you sad?
Are you tired?
Is M. sick?
Is he disappointed?

When come you (will you come)?
When write you (will you write)?

Think!
Come!
Eat!

Go not (Don't go)!

Be not (Don't be) angry!

Be not (Don’t be) sad!
Be not (Don’t be) sure!

APPENDIX 14: BARCELONA PROFESSIONALS WORKSHOP – QUESTIONNAIRE RESULTS

The following is a summary of the questionnaires completed by professionals:

No. 1

Profession: Psychologist
Level of Assistive Technology Experience: Medium
Level of AAC Experience: Low
Level of familiarity with the Internet: High
Comments
From my point of view it seems to be a very accessible and organised navigator even though the icon were a little difficult to understand, maybe this was because I am very used to using the traditional navigators. It is possible that for people that communicate using SAAC, and have never before used icons, they wouldn't find it so difficult.

With respect to e-mail, it seems to me to be a good idea to support what you want to say with images for patients who for whatever reason may have difficulties using language.

A very interesting talk that could open and facilitate the use of navigator for this type of person

No. 2

Profession: Teacher
Level of Assistive Technology Experience: Medium
Level of AAC Experience: Medium
Level of familiarity with the Internet: Medium
Comments
It can be a good option for many users. Combining the options of the program with the facilities of SAAC could really increase the autonomy of many people

No. 3

Profession: Speech therapist
Level of Assistive Technology Experience: Medium
Level of AAC Experience: Low

Level of familiarity with the Internet: Medium
Comments
I think it is a very good idea for people who have difficulties at the motor level, but I get the impression that it will require a lot of effort for people that have more cognitive damage. Also the icons on P7 (could be P9, I am not sure about the writing) are not very clear, and above all, in the last email that was presented, P7 (again could be P9) required a good knowledge of grammar. It is precisely these people who are the ones who have the most problems communicating themselves.

No. 4

Profession: Teacher
Level of Assistive Technology Experience: Medium
Level of AAC Experience: Medium
Level of familiarity with the Internet: Medium
Comments
Well done. I think it is a good technological advancement for the whole world. The initial learning will be complicated and depends on the user.

No. 5

Profession: Speech Therapist and Teacher
Level of Assistive Technology Experience: High
Level of AAC Experience: High
Level of familiarity with the Internet: Medium
Comments
Fantastic and useful. We are definitely waiting for it.

No. 6

Profession: Special education
Level of Assistive Technology Experience: High
Level of AAC Experience: Medium
Level of familiarity with the Internet: High
Comments
If I were a user of AAC I would be delighted. Thank you very much.

No. 7

Profession: Software developer
Level of Assistive Technology Experience: High
Level of AAC Experience: Low
Level of familiarity with the Internet: High
Comments
It is very configurable and seems like it could be adapted to a wide group of users. When it becomes available we would like to receive information about it.
Thanks

No. 8

Profession: Speech Therapist and Psychologist
Level of Assistive Technology Experience: High
Level of AAC Experience: High
Level of familiarity with the Internet: Medium
Comments
Firstly, thank you very much for your investigation. The products appear to me to be very interesting and are going to allow us to offer many opportunities towards autonomy to or users. I hope to soon have them all at our disposal.

No. 9

Profession: Teacher
Level of Assistive Technology Experience: Low
Level of AAC Experience: Low
Level of familiarity with the Internet: Medium
Comments
Taking into account that I am a novice in this world of S.A.C and accessibility of the computer I have managed really well with the work that you have done. I think that I could be a very useful instrument particularly for those who can, and want to, access the Internet.

No. 10

Profession: Speech Therapist
Level of Assistive Technology Experience: Medium
Level of AAC Experience: Medium
Level of familiarity with the Internet: Medium
Comments
Congratulations on your work.

I think it is a good option for people with special educational needs. It offers the ability to be themselves (with a certain level of help) to whoever can access the Internet. It can help and increase their self-esteem and motivation. I really want the users in my centre to use it!
Many thanks and onward!

No. 11

Profession: Psychologist
Level of Assistive Technology Experience: Medium
Level of AAC Experience: Low
Level of familiarity with the Internet: Medium
Comments
I find it very interesting the whole subject of mail and accessibility to the Internet. I think it could be very …… although there still exist boundaries regarding access (difficulties or problems with reading comprehension). I think that the base program can be used in more serious……. The idea of organisation and of clarity in the icons is good and the most important is that it is very functional.

(dotted lines indicate difficulty reading handwriting)

No. 12

Profession: Psychologist
Level of Assistive Technology Experience: Medium
Level of AAC Experience: Low
Level of familiarity with the Internet: High
Comments
Above all I found the navigator very interesting, particularly if it were to be used to wok certain themes in question. However, the power to add things to your favourites …… on a third person or requires a learning process already not very visual.
To me the email appeared very right/correct, above all because on a visual level everything was very clear and this helps the level of autonomy.

Finally, the grammatical construction came over a little complicated seeing that they already have to learn a system of abstract signs.

APPENDIX 15: CONSULTATIONS WITH OLDER USERS

Background
1. Approximate age of user:
User B: 66-75 years
User C: Just turned 75 years
User L: 46-55 years
User R: 84

Functional disability:
User B: No functional disability over and above the normal course of ageing
User C: Visual impairment, just through ageing, wears reading glasses, but noted this in particular.
User L: No functional disability
User R: Visual impairment (vision in only one eye)

Current use of computers

User B: Used in Manager's office of the shared housing scheme only, but since being in hospital, has not used it a lot lately.
User C: Used in Manager's office of the shared housing scheme, uses quite a lot, 2-3 times a week.
User L: Used in Manager's office of the shared housing scheme.
User R: Used at home, every day

Current use of the World Wide Web

User B: Used in Manager's office of the shared housing scheme only, but since being in hospital, has not used it a lot lately.
User C: Used in Manager's office of the shared housing scheme, uses quite a lot, 2-3 times a week.
User L: Used in Manager's office of the shared housing scheme
User R: Used at home, every day

Current use of Email

User B: Used in Manager's office of the shared housing scheme only, but since being in hospital, has not used it a lot lately.
User C: Used in Manager's office of the shared housing scheme, uses quite a lot, 2-3 times a week.
User L: Used in Manager's office of the shared housing scheme

User R: Used at home, 2-3 times a week

Independence in computer access
Access achieved independently: Users B, C, L, R

Independence in Internet access
Access achieved independently: User B, C, L, R

If accessing the Internet, what software has been used?
For each user:
Browser: Internet Explorer
Email: Outlook Express

Browser:

4. What do you think about using the WWAAC browser to explore the Internet?

1 2 3 4 5

Or the key to be used for the remainder:
Very good (1), good (2), neutral (3), bad (4), very bad (5)

	User B	User C	User L	User R
UK (elderly)	1	1	1	1

User L: Easy to see things

5. What do you think of the pictures on the buttons?

Very good (1), good (2), neutral (3), bad (4), very bad (5)

	User B	User C	User L	User R
UK (elderly)	1	1	2	1

User L: Good once get used to it.

6. What do you think of the layout of the buttons?

Very good (1), good (2), neutral (3), bad (4), very bad (5)

	User B	User C	User L	User R
UK (elderly)	2	1	2	1

User B: Not too much time to find out.

7. How easy was it for you to select the buttons?

Very good (1), good (2), neutral (3), bad (4), very bad (5)

	User B	User C	User L	User R
UK (elderly)	1	1	2	1

User B: Not much difference with using the mouse with Internet Explorer.
User C: Very clear and simple. Don't think we can really improve on what is here.
User L: Once you know where they are it's easy
User R: Very clear and simple. Don't think we can really improve on what is here.

8. Are there any things you especially like about the web browser?

User C: Clear Icons, easier to use, more explanatory than other browser.
User L: Saving websites to favourites. Pictures of favourites and favourites saved as homepage.
User R: Clear Icons, easier to use, more explanatory than other browser.

9. Are there any things you really dislike about the web browser?

User L: Couldn't keep the radio on when visiting other websites (referring to existing functionality of Internet Explorer)

10. Are there any improvements we should make?

User B: No suggestions just now.
User C: Not at the moment, but don't know what will happen later.
User L: Being able to keep more than one window open.
User R: Would need more time to suggest something.

11. Would you want to use this software again?
Yes: Users B, C, L, R

12. After using the software a few more times with support, could you imagine using this software on your own?

Yes: Users B, C, L, R

13. Using this software, do you feel that you would be able to use the Internet more independently that you did before?

N/A

14. If you used browser software before WWAAC, which system did you prefer?

User B: WWAAC, with its big buttons. But need more practice to know for sure.
User C: WWAAC
User L: WWAAC
User R: WWAAC

Any other comments:

Users C and R wanted to turn the speech off, but thought that it might sometimes be useful (although couldn't say when).
User L: Need to be able to do things that are possible with Internet Explorer (i.e. using radio)
Zoom in/out and the scroll worked on some sites (e.g., the Care on Line site) but not on others. The scroll buttons also didn't always work.
Users asked if the software could be kept on the computer in the manager's office where they can use it when they like. All 4 users want to be kept informed when the final software is available.

Compared to conventional browsers the WWAAC browser has lost some functionality which would be useful for people without communication impairments or more advanced users:
Autosaving last few addresses visited
Autocomplete of previous address entered again

Editing the address in the address bar is not easy as IE
History of websites visited
Being able to open more than one window at a time (i.e. when wanting to listen to radio over the net while surfing)
Flash etc. may only be inaccessible only if a screen reader is being used, users should be made aware of this
Be as reliable as Internet explorer

Some of the advantages of the WWAAC browser:

Favourites page is the home page
Easy to see and select the large buttons
Easy to zoom in and out
Favourite websites have an image

APPENDIX 16: WORKSHOP WITH PEOPLE WITH LEARNING DISABILITIES (NL)

RESULTS: END-USERS PRE-SYMBOLIC LEVEL

The instructor and end-user answer each question in the box.
The answers have been reflected in five point scales:
1 entirely agree
2 agree
3 neutral
4 disagreement
5 entirely disagreement

	1	2	3	4	5
Browser					
the user thinks starting the browser easy	2		1		
Navigation					
the user understands the images on the buttons			2		1
the user understands the text on the buttons					3
the user thinks the size of the buttons is well	3				
the user thinks the number of buttons is well	3				
the user thinks scrolling with the special buttons is easy	1				
the user thinks special buttons for scrolling is necessary			1		1
the user thinks a speech button by rule is necessary					
the user thinks starting the speech button by rule is easy			2		1

the user thinks a speech button by subparagraph is necessary			3		
the user thinks using the buttons is easy	3				
Visiting sites					
the user thinks starting favourite sites is easy	2				1
the user thinks the number of favourite sites is well	1		2		
the user approves the speed of finding a favourite site	2		1		

RESULTS: END-USERS SYMBOLIC LEVEL

The instructor and end-user answer each question in the box.
The answers have been reflected in five point scales:
1 entirely agree
2 agree
3 neutral
4 disagreement
5 entirely disagreement

	1	2	3	4	5
Browser					
the user thinks starting the browser is easy	3				
Navigation					
the user understands the images on the buttons	3				
the user understands the text on the buttons	2		1		
the user thinks the size of the buttons is well	3				
the user thinks the number of buttons is well	3				
the user thinks scrolling with the special buttons is easy	2				
the user thinks special buttons for scrolling is necessary					2
the user thinks a speech button by rule is necessary					
the user thinks starting the speech button by rule is easy			1		1
the user thinks a speech button by subparagraph is necessary			1		2

the user thinks using the buttons is easy	3				
Visiting sites					
the user thinks starting favourite sites is easy	3				
the user thinks the number of favourite sites is well	2				1
the user approves the speed of finding a favourite site			2		1

RESULTS: OPINION INSTRUCTOR – END-USERS PRE SYMBOLIC LEVEL

The instructor answers each question in the box. He considers the communication level of the end-user.
The answers have been reflected in five point scales:
1 entirely agree
2 agree
3 neutral
4 disagreement
5 entirely disagreement

	1	2	3	4	5
Browser					
the instructor thinks starting the browser for the user is easy		2	1		
Navigation					
the instructor thinks the images on the buttons are understandable for the user				3	
the instructor thinks the text on the buttons is understandable for the user				1	2
the instructor thinks the size of the buttons is well for the user	3				
the instructor thinks the number of buttons are well for the user	3				
the instructor thinks scrolling with the special buttons is easy for the user		1		1	1
the instructor thinks special buttons for scrolling are necessary for the user					3
the instructor thinks starting the speech button by rule is easy for the user					

the instructor thinks a speech button by rule is necessary for the user					
the instructor thinks starting the speech button by subparagraph is easy for the user	2		1		
the instructor thinks a speech button by subparagraph is necessary for the user	2		1		
the instructor thinks using the buttons is easy for the user	3				

Visiting sites					
the instructor thinks starting favourite sites is easy for the user	3				
the instructor thinks the number of favourite sites are well for the user	3				
the instructor approves the speed of finding a favourite site for the user	3				

RESULTS: OPINION INSTRUCTOR – END-USERS SYMBOLIC LEVEL

The instructor answers each question in the box. He considers the communication level of the end-user.
The answers have been reflected in five point scales:
1 entirely agree
2 agree
3 neutral
4 disagreement
5 entirely disagreement

	1	2	3	4	5
Browser					
the instructor thinks starting the browser for the user is easy	2		1		
Navigation					
the instructor thinks the images on the buttons are understandable for the user	2		1		
the instructor thinks the text on the buttons is understandable for the user		1	1	1	
the instructor thinks the size of the buttons is well for the user	3				
the instructor thinks the number of buttons are well for the user	3				
the instructor thinks scrolling with the special buttons is easy for the user	1	1		1	
the instructor thinks special buttons for scrolling are necessary for the				2	1

user					
the instructor thinks starting the speech button by rule is easy for the user					
the instructor thinks a speech button by rule is necessary for the user					
the instructor thinks starting the speech button by subparagraph is easy for the user	1		2		
the instructor thinks a speech button by subparagraph is necessary for the user			1		2
the instructor thinks using the buttons is easy for the user	3				

Visiting sites					
the instructor thinks starting favourite sites is easy for the user	3				
the instructor thinks the number of favourite sites are well for the user	2	1			
the instructor approves the speed of finding a favourite site for the user		1			

CHECKLIST FOR TESTING THE BROWSER

Answer each question in the box.
The answers have been reflected in five point scales:
1 Is entirely once
2 is once
3 is neutral
4 is in disagreement
5 entirely disagreement

	1	2	3	4	5
Installation					
The instructor thinks the installation of the web browser is easy	N/A	N/A			
The instructor thinks installation of the browser happens fast	N/A	N/A			

Time required for installation:

Adding sites					
The instructor thinks adding a favourite new site is easy	3				
The instructor approves the speed of adding a favourite site	3				
The instructor thinks adding an image at the button of favourite sites is easy		3			

The instructor approves the speed of adding an image at the button of favourites sites		3			

Time required for adding 1 site: 5 seconds
Time required for adding an image at the button of favourite sites: 3 minutes

APPENDIX 17: APHASIA WORKSHOP (NETHERLANDS)

Background

Approximate age of user:

User R: 56-65 years, speech and language disability, able to talk, understands what you explain and/r ask him, he can write, talks a lot, not sure if he understands everything going on around him.

User K: 66-75 years, speech and language disability, able to read

User Jo: 46-55 years, speech and language disability, can read and talk, has artificial respiration

User Ja1: 46-55 years, speech and language disability, good understanding, experienced Internet user

User Ja2: 36-45, speech and language disability, can copy a text, can write but most times the words are not correctly written, hemiplegia on the right side, was left handed before, left hand is used now.

Current use of computers, WWW and email
User R: Used at home and at day care centre (+-), Access achieved independently.
User K: Used at home and at day care centre (+), Access achieved independently.
User Jo: Used at home and at work (++) and only computers and WWW at day care centre (+),Access achieved independently
User Ja1: Used at home (++) and at day care centre (+). Email not used so much (+) at day care centre. Access achieved independently.
User Ja2: Used computer once at day care centre, used WWW for the first time at day care centre during this evaluation. Never used email. Access achieved with support.

Browser:

4. What do you think about using the WWAAC browser to explore the Internet?

Very good (1), good (2), neutral (3), bad (4), very bad (5)

	User R	User K	User Jo	User Ja1	User Ja2
Aphasia NL	1	1	1	4	1

User R: Seen from his period of severe aphasia, it would have been a very helpful program (‘therapy’)
User K: Great, reading out loud can be very useful for others (aphasia) not necessary for me.

5. What do you think of the pictures on the buttons?

Very good (1), good (2), neutral (3), bad (4), very bad (5)

	User R	User K	User Jo	User Ja1	User Ja2
Aphasia NL	2	2	2	3	1

User R: Colour on the buttons.
User K: Only useful buttons, to many others are confusing, for example the link buttons.
User Jo: Not always clear, pictures are less important, but the text with the buttons is of great importance for her.
User Ja2: Could only understand with help today. Coloured buttons.

6. What do you think of the layout of the buttons?

Very good (1), good (2), neutral (3), bad (4), very bad (5)

	User R	User K	User Jo	User Ja1	User Ja2
Aphasia NL	2	1	1	3	1

User R: Large buttons are ok, no extra buttons on it like link, follow link, is interested in scroll up and down buttons.
User K: Favourites page is great
User Ja1: Coloured buttons best
User Ja2: Only uses reading text and paragraph (the switch buttons between these was confusing for her) and home and next ad previous. Enthusiastic about the favourites page, this helps her, because of her difficulty to write (or copy).

7. How easy was it for you to select the buttons?

Very good (1), good (2), neutral (3), bad (4), very bad (5)

	User R	User K	User Jo	User Ja1	User Ja2
Aphasia NL	1	1	1	1	1

Users all used the mouse as input.
User Jo: thinks that when she is tired she would like to use one button of key to select. Or if her hand is getting tired. This software gives her confidence that she still could use the Internet when she is in bad condition.
User Ja2: Easy with the mouse.

8. Are there any things you especially like about the web browser?

User R: Flexibility, needs to be adapted quickly
User K: Favourites page
User Ja1: I don't like it and no need to use it.
User Ja2: Reading out loud! Favourites!!

9. Are there any things you really dislike about the web browser?

10. Are there any improvements we should make?
User Jo: Flexibility. Only text in buttons.

11. Would you want to use this software again?
Yes: Users R, K, Jo, Ja2
No: User Ja1, It is not necessary for me.

12. After using the software a few more times with support, could you imagine using this software on your own?

User R: thinks he can use it the next time alone.
User K: Yes, I can use it now already.
User Jo: Yes, already after one instruction.
User Ja2: Yes, but she will need more support than anyone else, but with this browser she could use the Internet in future.

13. Using this software, do you feel that you would be able to use the Internet more independently that you did before?

User R: his children are always using the computer, there is nearly a moment for him!
User K: No difference for me, I think although I would really like to use this software at home.
User Jo: Maybe when in bad condition.
User Ja1: No
User Ja2: Yes.

14. If you used browser software before WWAAC, which system did you prefer?

User R: Don't know
User K: No difference for me, I think although I would really like to use this software at home.
User Jo: Both
User Ja1: Normal browser software
User Ja2: WWAAC browser.

Any other comments:
User R: Most important for him are the favourites and reading and listening at the same time. It still helps him when he is tired, but would have helped him a lot as a sort of revalidation.
User Ja1: I'm accustomed to normal browser, for me favourites are more clear in normal browser.
User Ja2: She not sure if she will still remember what she learned today, but is willing to try it more often.

Concluding: a beginning Internet user, without experience and disabled, will have extra support in using this software.

APPENDIX 18: APHASIA WORKSHOP (UK)

Questionnaire – PROFESSIONALS

Profession
SLT
SLT
SLT

Level of experience with Assistive Technology
High
High
High to Medium

Level of experience with AAC
High
High
High

Level of experience with Internet
High
High
Medium

Key: very good (1), good (2), neutral (3), bad (4), very bad (5)

What do you think about using the WWAAC browser to explore the Internet?

(1) Think its great – its simplified a process which can be quite complicated
(2)
(1) Larger text on buttons

What do you think of the pictures on the buttons?

(1) All configurable so = fab
(1)
(2)

What do you think of the layout editor?

(1) Looks simple to use
(2)
(2)

Are there any things you especially like about the web browser?

screen reader good, zoom in /out of text good and ability to put a few or lots of editing buttons [kb. Think she is referring to function buttons on the browser and the ability to control how many the user has access to]
Flexibility – e.g. buttons, text size, colour, zoom option, option to alter scroll bar [kb. i.e. to have scroll up, scroll down buttons rather than user having to use standard windows scroll bars]

Are there any things you really dislike about the web browser?

Still quite 'busy', rather than highlighting borders for scrolling / switching through items, could we have coloured background?
Need to be wary of having too many buttons on page as danger of becoming too 'busy'

Are there any improvements we should make?

Yes. Possibility to click on acronym and get an explanation. Screen reader which is easier to understand / inserts pauses … ?! … [*Evaluator*: *Were using SAPI Mary and did demonstrate ability to slow down speech synthesiser*]
Highlight whole buttons (on favourites page)

Does the browser provide all the functionality needed by users and their facilitators?

Yes
No but not sure this is technically possible!!
Would need to trial more specifically with users to be able to comment

Do you think that the end users you work with will be able to use the Internet more independently with this software than before?

I think its fab for people who have communication partners who will support them using web (initially compiling favourites, adding brand new sites to favourites)
To a certain extent, yes.
Potentially yes, however require training ++ and then maintenance of skills (which is difficult to provide long term)

How does the WWAAC browser compare with mainstream browsers?

Simplified it. Symbolised it.
Obviously better.

What do you think about the email software?

(1)
(2)
(2)

What do you think about the supportive writing?

(4)
(4)
(4 ?) [*Evaluator*:. *She put a question mark above this face*] A lot to learn linguistically and cognitively. Can't see a person with aphasia being able to use functionally. May have application for therapy.

What do you think of the pictures on the buttons?

(1)
(2)
(2) Cannot think of any alternatives! (unless you had pictures of actual postboxes etc. but then that would end up culture specific!)

What do you think of the layout editor?

(1)
(2)
(1) Clear

Are there any things you especially like about the email?

Nice and simple. Can run with other programmes. Like the way it will read text aloud. I like the photos which can be added.
Simplified visual input, screen reader, personalised photo contacts

Are there any things you especially like about the supportive writing?

Good concept but people I see, if they had high enough level of language to use it, they'd be writing clear enough sentences to understand!
[drew a line through the answer area]

Are there any things you really dislike about the email?

Not everyone has software which will run with the programme therefore creating emails remains difficult.

No

Are there any things you really dislike about the supportive writing?

Just too complex linguistically so message ends up very disrupted like a language translator e.g. I wanted to say "I'm going to see my mum this afternoon" I got "I am going to watch my mother"…! [*evaluator: Actually it was even worse – it was 'I am advancing to watch'*]

Are there any improvements we should make?

Accept all forms of verbs and software modifies accordingly
i.e. 'we is going',
'we to go', 'we're going'
'we am go'
because very few of my patients use infinitive

Does the software provide all the functionality needed by users and their facilitators?

No, but not sure its technically possible to achieve this!

Do you think that the end users you work with will be able to use email more independently with this software than before?

yes
yes

Do you think that the end users you work with will be able to write better-formed sentences with the supportive writing?

[drew line through answer area]
NO! I genuinely think in its current states that they'd end up with worse formed sentences! They'd have more comprehensible sentence using cowriter or clicker even if the grammar is a bit idiosyncratic.
Not particularly

How does the WWAAC email compare with mainstream email software?

Much simpler
Better, clearer, simpler
Much simpler, clearer layout, good use of icon buttons.

END USERS

What do you think of the WWAAC Browser?
(1)– 1
(1 – 2) – 1
(2) – 2
(3) – 1

What do you think of the WWAAC Email?
(1) – 3
(2) – 2

APPENDIX 19: SNAPSHOT MATCH WITH USER REQUIREMENTS

Specification Feature	Product Usability Goals	Degree of match	Action Required
Accessibility (Physical)			
Software facilitates physical access (e.g., supports scanning interface, mouse alternatives, and keyboard access, without reliance on scrolling windows, click and drag applications, etc.)	Software accommodates a range of physical disabilities by offering different access modes (direct and indirect).	Good	Improve robustness
Implements techniques for increased speed of access (e.g., automatically caching frequently used sites, use of macros, etc.)	Reducing long connection times where possible.	Not implemented	Implement in final product
Portable (e.g., possible integration of wheelchair controls with AAC and computer access)	Need for portability so software is available when needed.	Not implemented	Implement in final product

Accessibility (Sensory/Cognitive)			
Software is simple and easy to use, with easy correction of errors.	User able to use system easily with back-up support, e.g. in the form of a Wizard, help facility, etc.	Moderate	Implement help facility for final product
Language is simple and terminology is clear.	Software considers the needs of people with language difficulties.	Good	Allow user to customise with own symbols, vocabulary and images
Adjustability in size and type of fonts, colours, etc., and images are scaleable.	Software considers the needs of people with perceptual problems.	Font – Poor Colours – Good Images – Good	Font size on buttons, with or without icons, needs to be more flexible
Limited information on a page, grouping of information.	Software considers the needs of people with cognitive difficulties.	Summary begins to address this	Promote accessibility guidelines to web developers
Software will support users with low levels of expressive ability for WWW	User with low level of expressive ability can benefit when using the WWW.	Good	Continue to involve users in future developments
Software will support users with high receptive ability and high expressive ability for email, discussion and echat.	Users with high receptive ability and high expressive ability can benefit when using email, discussion and echat.	Good	Continue to involve users in future developments

Training and Support			
Training is provided, in the cost of the product, to both the user and facilitator, including also a demo version to provide added value.	High degree of training to both user and facilitator.	Not yet implemented	Consider in final developments
High degree of support, e.g. in the form of a set-up Wizard, and a 'package of care'	User and facilitator receive support when needed, during and following set-up, on both hardware and software issues.	Not yet implemented	Consider in final developments
Provision of trial usage or demo disk	Ensuring technology matches user's needs	Not yet implemented	Consider in final developments
Communication partners can be made aware of language support strategies by people with communication impairments.	Protocols/strategies can be included in Code of Practice.	Not yet implemented	Consider in final developments

AAC Compatibility			
Symbols are fully integrated as part of the interface, e.g. a symbol-based print facility	Symbol user finds high and low tech (e.g., symbol charts) systems compatible	Not yet implemented	Consider in final developments
Software facilitates compatibility between AAC and PC, e.g., through file interchange.	AAC device will be able to communicate with WWAAC software in a seamless fashion.	Not implemented	Implement in final product
Software will interface with adapted hardware, e.g. support for serial keys.	WWAAC software can communicate with adapted hardware in a seamless fashion.	Not implemented	Implement in final product
Symbol translation from: PCS ↔ Bliss Bliss ↔ Text PCS ↔ Text	Most frequently used symbol systems are supported.	Good, when concept coding framework complete	Improve robustness

Adaptability			
A number of options are provided, which facilitate access by multiple users of the software, e.g. alternative input/output modes, non-reliance on mouse, scrolling windows, click-and-drag, etc.	Software accommodates a range of disabilities (physical, sensory, communication, cognitive)	Good	Improve robustness
Ability to accommodate individual users, e.g. user profiles and defaults, storing personal set-ups and transferring them to another computer.	Adaptability and flexibility in the design options.	Moderate	More work needed to better accommodate user defaults and preferences
Ability to adapt/customise interface, e.g., Scanning support facility such as type-ahead facility, Shortcuts and macros, Predictive software for language support	Adaptability of interface to meet individual user's needs.	Not implemented	Consider further customisation in future developments
Facility to adapt/customise/ add symbols to database set (from paper through scanning, from computer, etc.)	Symbol users find vocabulary is sufficient and appropriate for their needs.	Not implemented	Allow users to customise with own symbols, vocabulary and images
Provision of an option to send just text or text + symbols.	Software caters for individual preferences on how they present themselves in email and discussion groups.	Discuss	Discuss

Language Support			
Software is supported in host language(s)	Software is usable in host languages, (with consideration of speech output).	Good (English, Swedish, Dutch, Finnish)	Improved speech technologies needed
Speech output is supported (plug in existing speech technology or develop new language support for the project?)	Speech output is a key requirement of many users.	Good (English, Swedish, Dutch, Finnish)	Improved speech technologies needed

Exploitation Issues			
System is reliable (e.g. with switch control)	Few or no technical problems.	Moderate	Improve robustness
Ability to purchase only part of the entire package, e.g., only the simple browser.	Modular usage is possible.	Moderate	Browser frozen at end of project for free access. Further developments on marketable products.
Ability to add-on other spin-off applications, e.g., chart-making facilities, drawing package, scanning and printing images, etc.	Integration of image manipulation with WWAAC and transferring information from one application to another, e.g., WWW to email, adding images to email, printing images from emails, printing images from WWW, putting images into drawing applications, etc.	Not implemented	Consider for future developments
Software is designed to safeguard security and privacy when using interactive services/e-commerce.	AAC users have the same rights to security and privacy as other users.	Good	Built into Internet Explorer, required firewalls as any other software
Software is designed to promote independent use of the Internet where possible.	Supported use of the Internet with this user group will decrease.	Good	Improve robustness
WWAAC software needed only on client's PC	Increased number of potential communication partners	Good	Assess copyright issues
Software has considered copyright issues and licensing agreements for symbol to symbol translation.	Copyright issues are critical in symbol usage.	Discuss	Consider permission to use symbols under copyright or license

Software has considered standardised coding to represent icons in order to facilitate symbol usage.	Standardised coding will facilitate symbol usage in WWW and email services.	Good	Continue improvements in concept coding framework
Software conforms to Microsoft accessibility standards, e.g., supports the use of serial keys, non-reliance on mouse input devices, etc.	Software conforms to standards.	Good	Continue to improve robustness
Software conforms to other necessary standards in software development, e.g. Bliss standards	Software conforms to standards.	Discuss	Continue to improve robustness